



**Volume 1**

**SUMMARY REPORT OF PREVIOUS  
ASSESSMENT ACTIVITIES**

**Former Torrington Heavy Bearings Facility  
South Bend, Indiana**

**Submitted to:**

**CAPSULE ENVIRONMENTAL ENGINEERING**

**St. Paul Minnesota**

**September 10, 1992**

**Project No. 53-2645**

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## EXECUTIVE SUMMARY

On behalf of The Torrington Company (Torrington), Capsule Environmental Engineering (Capsule) selected Law Environmental (Law) to assist in providing environmental consulting services for the former Torrington Heavy Bearings Facility in South Bend, Indiana. The services consisted of reviewing previous assessment activities, providing a summary of potential remedial alternatives, and recommendations for additional assessment activities.

Numerous others have performed assessment activities at the site. The assessment activities included the installation of soil borings and monitoring wells, collection, sampling, and analyses of soil, ground water, surface water, sediments, paint chips, and waste pit contents, and a soil gas investigation. Based on the assessment activities by others, the primary constituents identified in the subsurface media were volatile organic compounds (VOCs). The primary VOCs identified during these assessments included 1,1,1-Trichloroethane (1,1,1-TCA), 1,1-Dichloroethene (1,1-DCE), 1,1-Dichloroethane (1,1-DCA), and Trichloroethene (TCE). Additionally, petroleum hydrocarbon constituents were identified at the site in the sediment of a former pond.

A potential source located at the southwest corner of the main building has been identified. Based on VOC concentrations in the ground water from monitoring wells located around the perimeter of the property, it appears that other unidentified potential sources exist. The vertical and lateral extent of the previously detected organics and inorganics have not been assessed.

To properly evaluate remedial alternatives, and based on the review of available data, Law recommends performing a full site characterization. This characterization would be performed in phases. The first phase would consist of a detailed soil gas investigation to identify potential source areas and lateral extent. Upon review of the soil gas investigation data, soil borings would be installed to assess the vertical extent of the constituents previously identified. Selected soil borings would be completed as ground-water monitoring wells. Ground-water monitoring would be performed to characterize the constituents in the ground water and evaluate their fate and transport. Based on the site characterization, remedial alternatives would be evaluated.



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September 10, 1992

Ms. Susan Price  
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**Subject: Summary Report of Previous Assessment Activities  
The Torrington Company  
3702 West Sample Street  
South Bend, Indiana  
Law Environmental Project No. 53-2645**

Dear Ms. Price:

Law Environmental, Inc. is pleased to submit this Summary Report of Previous Assessment Activities for the former Torrington Heavy Bearings Manufacturing Facility located at 3702 West Sample Street in South Bend, Indiana. These services were requested by Capsule in a letter dated July 30, 1992.

We appreciate the opportunity to provide environmental consulting services to Capsule. Should you have any questions regarding this report or the project in general, please call.

Very truly yours,

LAW ENVIRONMENTAL, INC.

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## 1.0 INTRODUCTION

On behalf of the Torrington Company (Torrington), Capsule Environmental Engineering (Capsule) selected Law Environmental (Law) to assist in providing environmental consulting services for the former Torrington Heavy Bearings Facility in South Bend, Indiana.

This report provides an overview of the site description and history, project objectives, and summarizes assessment and remedial activities and analytical data. Also included are preliminary remedial alternatives, conclusions, and recommendations.

### 1.1 Site Description

The former Torrington Heavy Bearings Facility is located at 3702 West Sample Street in South Bend, Indiana (Figure 1). The site is approximately 16 acres and includes a 352,000 square foot manufacturing building, foundry building, solvent still building, storage building, and a surface water pond (Pond 1). Four additional ponds (2 through 5) south of the main building and west of the foundry previously existed on the property (Figure 2). These ponds, as well as Pond 1, were used to collect surface drainage and discharge from floor drains inside the building. Ponds 2 through 5 have reportedly been remediated and filled. Twenty ground-water monitoring wells are located on site with five of the 20 monitoring wells located in two parking lot areas north of the manufacturing building. Additionally, two production wells (Torrington Wells No. 3 and 4) are located within the west and east portion of the main building, respectively (Figure 3).

According to a previous assessment report by Canonie Engineers (Canonie) and facility drawings, seven underground storage tanks (USTs) and one above ground tank were previously located at the site. One 8,000-gallon above ground tank containing waste oil, one 12,000-gallon UST containing cutting oil, and two 20,000-gallon USTs containing fuel oil were located near to the southwest corner of the manufacturing building. Two 8,000-gallon

USTs containing stoddard solvent oil were located east of the main building, and two 550-gallon USTs containing gasoline were located south of the main building and west of the storage building (Figure 2). Additionally, underground piping and two oil/water separators are present at the facility. A site map showing their locations is included in Figure 4.

## 1.2 Site History

In 1928, the Bantam Bearings Corporation began the manufacturing of ball, thrust, radial, tapered, and cylindrical roller bearings at the facility. Torrington purchased the operations in December 1935 and in May or June 1943, the facility was renamed the Torrington Company Bantam Bearings Division. At a later date, the facility was renamed the Torrington Company Heavy Bearings Division.

From 1928 to 1967, numerous additions were constructed to the original building. By 1967, the manufacturing facility had reached its present size.

In September 1983, the manufacturing facility was closed. Negotiations for transfer of property ownership to the Urban Enterprise Association (UEA) of South Bend, Indiana began in October 1989 and were completed in June 1991.

## 1.3 Previous Assessment Activities

Previous assessment activities were performed at the site by others from 1984 to 1992. These activities were summarized in the following reports:

- Canonie, "Environmental Assessment", 1984 (Appendix A)
- The Torrington Company, "Environmental Assessment", March 11, 1985 (Appendix B).
- Harza Environmental Services, "Environmental Assessment", June 1986 (Appendix C).

- BEST Environmental, "Final Report, Environmental Assessment", October 1990 (Appendix D).
- BEST Environmental, "Subsurface Environmental Assessment and Remedial Action Plan", April 1991 (Appendix E).
- Capsule, "Torrington Investigation Report", December 11, 1991 (Appendix F).
- Capsule, "Phase II Torrington Investigation Report", May 26, 1992 (Appendix G).

In 1984, Environmental Instrument Systems (EIS) collected surface water and sediment samples from each of the five ponds (Figure 2) located on site as well as water samples from Torrington's two production wells (Torrington Wells No. 3 and 4) (Appendix B). Canonie was retained by Torrington's attorneys (Barnes and Thornburg) in July and August 1984 to perform an additional environmental investigation. The investigation included the installation of six monitoring wells (monitoring wells S-3 and W-1 through W-5) and seven soil borings (soil borings A-1 through A-7) (Figure 3). Additional surface water and sediment samples were collected from each of the five ponds. The results of this investigation lead to the installation of two additional monitoring wells (monitoring wells W-7 and W-8) and 14 soil borings (soil borings A-8 through A-21) by Canonie (Appendix A) (Figure 5).

According to BEST Environmental's (BEST) "Final Report, Environmental Assessment," October, 1990, three USTs (the two 20,000-gallon fuel oil tanks and the 12,000-gallon cutting oil tank) and 1,600 cubic yards of soil were excavated and removed in 1986. Tank removal documentation describing the depth, extent of excavation, and confirmatory analyses is unavailable (Appendix D).

In March and April, 1986, Harza Environmental Services (Harza) collected additional ground-water, soil, and pond sediment samples to verify the results from previous assessment activities by EIS and Canonie (Appendix C).

In August 1990, BEST collected soil samples from 31 floor corings (depths of 18 inches) from the main, foundry, and solvent still buildings. Ground-water samples were also collected from monitoring wells W-1, W-4, S-3, and W-8. Paint chip and waste pit samples were collected from inside the main building. Figure 6 shows the floor corings, paint chip, and waste pit sampling locations (Appendix D).

BEST installed seven additional monitoring wells (monitoring wells W-9, W-10A, W-10B, W-11A, W-11B, W-12, and W-13) at the site in January through February, 1991 (Figure 3). Additionally, one soil boring was conducted in each pond (soil borings BP-1 through BP-5) to depths of 6 to 10 feet (Appendix E).

In September 1991, Capsule performed investigations to assess the sediment in former Pond 4 and to further characterize the ground water associated with the parking area north of West Sample Street and generally downgradient of the main facility building. Four monitoring wells (monitoring wells W-14A, W-14B, W-15A, and W-15B) (Figure 3) were installed north of the main building in the parking lot area and one soil boring (soil boring PD4-1) was conducted in former Pond 4 (Appendix F).

In February 1992, an additional monitoring well (monitoring well W-16) was installed in the northeast corner of the west parking lot (Figure 3) under the supervision of Capsule. Thirteen soil borings (soil borings S3-1 through S3-9 and S3I-1 through S3I-4) were installed near monitoring well S-3 to depths of 8 to 14 feet. The locations of the 13 soil borings are shown in Figure 7. Additionally, eight soil borings (soil borings PD4-2 through PD4-9) were installed in former Pond 4 to depths of 8 to 10 feet (Figure 8). In March 1992, all monitoring wells on site were sampled by Canonie under the direct supervision of Capsule (Appendix G).

A soil gas investigation was performed by Tracer Research Corporation (Tracer) under supervision of Capsule in April, 1992. 47 soil gas samples were collected at depths of 4 to 6 feet. The general sampling locations are shown in Figures 1 and 2 in Appendix H. (Refer to Figure 2 in the text for general sampling locations in relation to the building).

## 1.4 Regulatory Guidance

Remedial investigation and corrective action activities performed at the site will be conducted according to Senate Enrolled Act 392 (The Act) and Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) remedial investigation/feasibility study (RI/FS) guidelines, as discussed in the following sections.

### 1.4.1 The Act

Under The Act, the Indiana State Legislature has enacted a voluntary clean-up program for sites which generally have been contaminated by past (unregulated) practices. This program will be established by July 1, 1993. Under The Act, the interested parties apply to the Indiana Department of Environmental Management (IDEM) for eligibility. If IDEM determines that the site is eligible for the program, the applicant will prepare a voluntary remediation work plan establishing clean-up levels. Generally, clean-up levels are based on background levels for soils and United States Environmental Protection Agency (EPA) drinking water standards for ground water. Site specific clean-up levels may also be negotiated.

### 1.4.2 RI/FS Guidelines

According to conversations between IDEM and Capsule, the RI/FS guidelines should be used for technical guidance for conducting environmental investigation and remedial activities at the Torrington facility. A letter sent to IDEM using certified mail and documenting this conversation is presented as Appendix I.

## 2.0 PROJECT OBJECTIVES

In July 1992, Law was retained by Capsule to review previous activities performed at the facility, prepare recommendations for additional investigative activities, and identify preliminary remedial alternatives for Torrington's former manufacturing facility in South Bend, Indiana. Law was also requested to prepare a "work plan" for the development of a RI/FS to investigate the facility and to develop and evaluate remedial alternatives.

## 3.0 SOIL ASSESSMENT SUMMARY

Site geology and subsurface soil assessments were performed at the site from 1984 to 1992. These soil assessment activities include soil borings by Canonie, Harza, BEST, and Capsule, floor corings by BEST, and a soil gas investigation by Tracer under Capsule's supervision. Monitoring well construction details for the soil borings which were completed as monitoring wells (soil borings W-1 through W-16 and S-3) are discussed in Section 4.2. The assessment activities associated with Pond 1 and former Ponds 2, 3, 4, and 5 are discussed in Section 5.0. Laboratory analytical data is discussed in Section 7.1.

### 3.1 Site Geology

The following description is based on boring logs and soil descriptions from previous assessment reports prepared by others.

The subsurface profile consists of a permeable stratum of sand and gravel overlaying a blue shale bedrock encountered at approximately 180 feet below ground surface. Interbedded with the sand and gravel are lenses of clay and sandy clay which vary in areal extent and thicknesses. The sand and gravel is divided by a stiff clay layer interspersed with sand and gravel approximately 20 to 30 feet in thickness. This clay layer is encountered at approximately 60 feet below ground surface. According to Canonie's "Environmental Assessment", 1984, the clay layer underlying the site is sufficiently impermeable and continuous to act as a confining layer for the lower aquifer. This clay layer pinches out to the east, providing a hydraulic connection between the upper and lower aquifers (Appendix A).

### 3.2 Soil Borings

On July 25 through August 15, 1984, Canonie supervised the installation of 13 soil borings (soil borings W-1, W-2, W-3, W-4, W-5, S-3, A-1, A-2, A-3, A-4, A-5, A-6, and A-7) at various locations throughout the site (Figure 3). The boreholes were advanced with a hand auger from the ground surface to the ground-water table. Below the ground-water table (approximately eight feet), the soil borings were advanced using a cable tool with an 8-inch diameter casing. Soil samples were recovered at each borehole during hand augering using a 1-inch diameter hand sampler tube with an acetate liner. The samples obtained below the ground-water table were recovered using a 2-inch outside diameter (O.D.) split barrel sampler with brass liners. Each soil sample was screened with a flame ionization organic vapor analyzer (OVA) to detect the relative concentrations of volatile organic compounds (VOCs). The soil sample from each borehole exhibiting the highest reading or a visible presence of oil was submitted to Gulf Coast Laboratories (Gulf Coast) in Park Forest South, Illinois for analyses (Appendix A).

In October 1984, 16 additional soil borings (soil borings W-7, W-8, and A-8 through A-21) were installed and sampled by Canonie using the same procedures previously described (Appendix A). Soil borings A-8 through A-21 were installed to depths of approximately nine feet in the area near the southwest corner of the main building (the S-3 area), as shown in Figure 5. Field headspace readings are included on the boring logs for all soil borings conducted by Canonie. The soil boring logs are provided as Appendix J.

In March 1986, Harza collected two soil samples near soil borings W-4 and S-3 using a stainless steel hand auger. A composite sample near monitoring well W-4 was collected from the first 12 inches of soil. The second sample was collected approximately four feet south of soil boring S-3 between five and six feet below ground surface. The samples were submitted to Environmental Research Group (ERG) in Ann Arbor, Michigan for analyses (Appendix C).



On January 28 through February 8, 1991, BEST installed seven additional soil borings (soil borings W-9, W-10A, W-10B, W-11A, W-11B, W-12, and W-13) at the site. The soil borings were advanced by a truck mounted drill rig using continuous flight hollow stem augers to depths of 30 to 60 feet. According to the BEST's "Subsurface Environmental Assessment and Remedial Action Plan", dated April 1991, soil samples were not collected due to "saturated unconsolidated granular soils" (Appendix E).

Two soil samples were collected by BEST to assess background total metal concentrations at the site. One soil sample (M-1) was collected from fill sand located under the northwest section of the plant. A concrete coring machine was used to advance a 4-inch diameter borehole through the floor. The soil sample (M-2) was obtained from a depth of 18 inches using a stainless steel trowel. The second soil sample was collected at a depth of three feet from auger cuttings produced from the installation of monitoring well W-9. The soil samples were submitted to Environmental Consultants, Inc. (ECI) in Clarksville, Indiana for analyses (Appendix E). The location of the soil samples is shown on Figure 3.

During the week of September 9, 1991, Capsule supervised the installation of five soil borings (soil borings W-14A, W-14B, W-15A, W-15B, and C1) to depths of 20 to 60 feet. The soil borings were installed in the parking lot north of the main building as shown on Figure 3. All soil borings, with the exception of soil boring W-14A, were advanced by a truck mounted drill rig using hollow stem augers. A "large cobble and boulder zone" was encountered during the drilling of soil boring W-14A. After two attempts to drill through this zone, soil boring W-14A was installed using mud rotary drilling techniques. Soil samples were not collected below the "cobble and boulder zone" in soil boring W-14A due to formation instability. In the remainder of the soil borings, soil samples were generally collected at 5-foot intervals using a split barrel sampler, with the exception of soil boring C1, which was sampled continuously. Each soil sample was screened with an HNU photoionization detector (PID) with a 10.2 eV lamp, which was used to screen the relative concentrations of VOCs. The soil sample from each soil boring exhibiting the highest VOC reading was packed in a 4-ounce glass jar and submitted to Aspen Research Corporation (ARC) in New Brighton, Minnesota for analyses (Appendix F).

During the week of February 24, 1992, Capsule conducted additional subsurface investigations at the site. Thirteen soil borings were installed in the S-3 area near the southwest corner of the building at depths of 8 to 12 feet. Nine of the soil borings (soil borings S3-1, S3-2, S3-3, S3-4, S3-5, S3-6, S3-7, S3-8, and S3-9) were installed outside the main building and four soil borings (soil borings S3I-1, S3I-2, S3I-3, and S3I-4) were installed inside the building (Figure 7). The designator "S3" was used for borings outside the building and "S3I" was used for soil borings within the building. Soil borings S3-1 through S3-6 were advanced with hollow stem augers to a depth of 12 feet with sampling terminating at 14 feet. Soil borings S3-7 through S3-9 and S3I-1 through S3I-4 were advanced to 8 feet using a hand auger. Soil samples were collected at 2-foot intervals in 4-ounce glass jars and screened using a PID as previously described. Selected soil samples were sent to ARC for analyses (Appendix G).

Upon completion, the soil borings were abandoned by filling with either a grout mixture or bentonite granules and potable water. Table 1 presents the results of the field headspace screening by Capsule. Soil boring logs for soil borings discussed in this section are provided as Appendix J.

### 3.3 Soil Corings

In August and September 1990, BEST installed 31 soil corings through the concrete floor of the main building, foundry, and solvent still building (Figure 6). Soil samples were collected from each coring hole to a depth of 18 inches and submitted to ECI for analyses (Appendix D).

### 3.4 Soil Gas Investigation

On April 27 through 30, 1992, Tracer, under supervision by Capsule, installed 47 soil gas samples at depths of 4 to 6 feet. The location of the soil gas samples are shown in Figures 1 and 2 in Appendix H. Refer to Figure 2 in this report for the general location of the soil gas samples in relation to the building. The sampling probes consisted of 7-foot lengths of 3/4-inch diameter hollow steel pipe with detachable drive tips. The aboveground end of each probe was fitted with an aluminum reducer (manifold) and polyethylene tubing leading to a vacuum pump. Soil gas samples were pulled by the vacuum pump into the probe and collected in a glass syringe. The vacuum was monitored by a vacuum gauge to ensure an adequate gas flow from the vadose zone. The soil samples were injected into an on-site gas chromatograph (GC) and analyzed for VOCs (Appendix H).

## 4.0 GROUND-WATER ASSESSMENT SUMMARY

Site hydrogeology and ground-water assessment activities were performed at the site from 1984 to 1992. These activities included monitoring well installation, development, and sampling analyses.

### 4.1 Site Hydrogeology

According to assessment reports referenced in Section 1.3, a "clay layer" was encountered at approximately 60 feet below the ground surface. The "clay layer" is reportedly 20 to 30 feet thick (i.e., about 60 to 90 feet below the ground surface) and acts as a confining layer creating an upper and lower aquifer. The upper aquifer averages approximately 60 feet in thickness (i.e., 0 to 60 feet below ground surface) and the lower aquifer averages approximately 90 feet in thickness (i.e., 90 to 180 feet below ground surface). The bottom of the lower aquifer is reportedly the shale bedrock typically encountered at approximately

180 feet below the ground surface. Based on information from previous assessment reports, the lower aquifer is the source of ground water for most major local industrial, commercial, and municipal users. The upper aquifer may be a ground-water source for some residential users. Previous reports indicate that ground-water flow is towards the north/northeast direction and is encountered at approximately 8 feet below ground surface in the upper aquifer.

Based on the previous site assessment reports, field activities have not been conducted to assess aquifer characteristics of the upper and lower units at the site (i.e., transmissivity, permeability, specific capacity, etc.) Additionally, the integrity of the clay layer at the site has not been evaluated.

#### 4.2 Monitoring Well Installation

Between 1984 and 1992, 20 ground-water monitoring wells were installed at the site. Monitoring well construction materials and installation techniques employed vary among the site monitoring wells as supervision during installation was conducted by three different consultants (Canonie, BEST, and Capsule). This section summarizes (in chronological order) monitoring well installation techniques as described in the previously referenced assessment reports written by Canonie, BEST and Capsule. Soil sampling conducted during the drilling of the monitoring well boreholes was discussed in Section 3.2.

In July and August of 1984, six ground-water monitoring wells (monitoring wells S-3, and W-1 through W-5) were installed at the site under the supervision of Canonie. Each monitoring well borehole was reportedly advanced by hand augering to the estimated ground-water table and completed to final depth utilizing cable tool methods by Peerless-Midwest, Inc. of Granger, Indiana. The total depths of the monitoring wells range from approximately 24 feet (monitoring well S-3) to 64 feet (monitoring well W-1). Monitoring wells W-1 through W-5 are constructed of 5-inch diameter Schedule 40 polyvinyl chloride (PVC) with flush threaded joints. Each screen is approximately five feet in length with 0.012-inch machined slots. Monitoring well S-3 is constructed of 4-inch diameter Schedule

40 PVC with flush threaded joints. The screen for monitoring well S-3 is five feet in length with 0.010-inch machined slots. According to Canonie's assessment report, the native sand and gravel was allowed to collapse around the monitoring well to depths of five feet below the ground surface in monitoring wells W-2, W-4, W-5, and S-3. The native sand and gravel was allowed to collapse to a depth of 40 feet below ground surface in monitoring wells W-1 and W-3. A cement/bentonite grout was placed on top of the sand to ground surface. Monitoring well installation diagrams provided in the Canonie report indicate that a bentonite plug was not used above the native sand pack in the construction of the six monitoring wells (Appendix A).

In October 1984, Canonie supervised the installation of two additional ground-water monitoring wells at the site. Monitoring wells W-7 and W-8 were installed to depths of 31.8 feet and 59.3 feet, respectively, utilizing rotary drilling methods. Each well was constructed with 4-inch diameter PVC and five feet of screen with 0.010-inch machined slots. The native gravely sand was allowed to collapse around monitoring wells W-7 and W-8 to depths of 8 feet and 9 feet, respectively. These wells were grouted to ground surface with a cement/bentonite mixture. Monitoring well installation diagrams prepared by Canonie indicate that a bentonite plug was not used above the native sand pack in the construction of monitoring wells W-7 and W-8 (Appendix B).

Between January 30 and February 6, 1991, BEST supervised the installation of seven ground-water monitoring wells (monitoring wells W-9, W-10A, W-10B, W-11A, W-11B, W-12, and W-13) at the Torrington site. Drilling was performed by Daily and Associates Engineering, Inc. of Champaign and Peoria, Illinois. Each monitoring well borehole was completed utilizing a truck mounted drill rig and hollow stem augers. The total depths of the monitoring wells range from 28.13 feet (monitoring well W-10B) to 58.51 feet (monitoring well W-10A) below ground surface. Each well is constructed of 2-inch Schedule 40 PVC with flush threaded joints. The screens of each monitoring well are ten feet in length and are constructed with two, five-foot sections of PVC screen with machined slots of 0.010 inch. The native sand and gravel was allowed to collapse around each monitoring well to depths between 6.16 feet below ground surface in monitoring well W-11B and 9.2 feet below ground surface in monitoring well W-9. A bentonite plug two feet thick was

placed on top of the native sand pack in each of the monitoring wells. The remaining annulus was filled with a cement/bentonite mixture to ground surface and a steel protective cover placed around the well (Appendix E).

In September 1991, Capsule supervised the installation of four ground-water monitoring wells (monitoring wells W-14A, W-14B, W-15A and W-15B) on site. Monitoring well W-14A was completed utilizing a mud rotary drill rig, whereas the remaining monitoring wells were completed using hollow stem augers. During mud rotary drilling, potable water and a bentonite drilling fluid were used. Drilling was performed by Layne Northern, Inc. of Lansing, Michigan. The total depths of the monitoring wells range from 18 feet (monitoring well W-15B) to 59 feet (monitoring well W-14A). Monitoring well W-14A is constructed of 4-inch diameter PVC and ten feet of screen with 0.010-inch machined slots. The native sand and gravel collapsed around monitoring well W-14A to a depth of 30 feet below ground surface. A bentonite plug six feet thick was placed on top of the native sand pack. The remaining annulus of monitoring well W-14A was filled with a cement/bentonite mixture (Appendix F).

The remaining monitoring wells (monitoring wells W-14B, W-15A, and W-15B) are constructed of 2-inch PVC and ten feet of screen with machined slots of 0.010 inch. A sand pack was placed around the screened interval of each monitoring well. The sand pack extends from the base of each monitoring well to approximately two feet above the top of the screened interval. A bentonite plug two feet thick was placed on top of the sand. The remaining annulus of each borehole was filled to approximately four inches below ground surface with a cement/bentonite mixture (Appendix F).

In February 1992, Capsule supervised the installation of monitoring well W-16 by Layne Northern to a depth of approximately 57 feet below the ground surface. This well was installed utilizing a mud rotary drill rig. Monitoring well W-16 is constructed of 4-inch diameter PVC with flush threaded joints and a ten foot screen with machined slots of 0.010 inch. A sand pack was extended to approximately two feet above the top of the screen. A two foot thick bentonite plug was placed on top of the sand pack followed by a cement grout to ground surface (Appendix G).

Monitoring well construction diagrams for the 20 monitoring wells and two production wells on site are provided as Appendix K. Table 2 summarizes the monitoring well installation diagrams.

#### 4.3 Monitoring Well Development and Ground-Water Sampling

EIS performed the initial surface water and sediment sampling from the surface water ponds on-site in 1984. EIS also sampled the two on-site production wells (Torrington Wells No. 3 and 4). Details regarding production well development and/or ground-water sampling techniques have not been documented (Appendix B). Laboratory analytical data for ground-water samples discussed in this section is included in Section 7.2.

Following installation of monitoring wells W-1 through W-5 and S-3 by Canonie, monitoring well development and ground-water sampling were performed. Development consisted of pumping in excess of 300 gallons of water from each monitoring well. Prior to sampling, Canonie utilized a stainless steel bailer to remove approximately two well casing volumes of water from the monitoring wells. Ground-water samples were collected from each of the six monitoring wells and the Torrington production wells and submitted to Gulf Coast for analyses. The stainless steel sampler was reportedly rinsed with reagent-grade hexane and distilled water after each sampling event (Appendix A).

On April 18, 1996, Harza performed assessment activities at the project site which included the collection of ground-water samples from monitoring wells W-2, W-4, W-5, W-7, and S-3. A Teflon bailer was utilized to collect the ground-water samples from each well. Harza's assessment report indicates that three well casing volumes of water were removed from each well prior to sampling. The five ground-water samples were submitted to ERG for analyses (Appendix C).

In August and September 1990, monitoring wells W-1, W-4, and S-3 were sampled twice at 30 day intervals by BEST. Monitoring well W-8 was sampled on October 1990. The samples were submitted to ECI for analyses. Sampling methodology has not been documented (Appendix D).

During January and February of 1991, BEST collected ground-water samples from monitoring wells W-1 through W-13 and S-3. Ground-water samples were collected using a dedicated WaTerra sampling system. In an attempt to establish when the volatile concentrations were representative of the surrounding formation water, a purge volume analysis was performed on all monitoring wells. Ground-water samples were collected at various purge volumes from each monitoring well and analyzed on-site with a portable GC. An impeller pump was used to evacuate a predetermined volume of water from each well while the WaTerra pump was used to collect the ground-water sample. The volume of water removed from each well varied from three well casing volumes in monitoring wells W-1, W-2, and W-8 to eleven well casing volumes in monitoring wells W-10B, W-11A, and W-11B. Fifteen selected ground-water samples (one from each ground-water monitoring well on site) were submitted to ECI for analyses. Split ground-water samples from monitoring wells W-7, S-3, W-9, and W-12 were also submitted to National Environmental Testing, Inc. (NET) in Indianapolis, Indiana for analyses. The selection of ground-water samples for laboratory analyses was apparently based upon field GC results and the determination by BEST field personnel that the selected sample was representative (Appendix E).

On September 23, 1991, Canonie, under the supervision of Capsule, collected ground-water samples from monitoring wells W-14A, W-14B, W-15A, and W-15B. Prior to sampling, all four monitoring wells were purged of at least three well casing volumes of water or until pH, temperature, and specific conductance were stabilized. Monitoring wells W-14A, W-15A and W-15B were purged with a high-density polyethylene (HDPE) bailer, while monitoring well W-14B (a 4-inch diameter well) was purged with a submersible pump. The purge water from the monitoring wells was discharged directly to the ground surface approximately fifteen feet from the well locations. A dedicated HDPE disposable bailer was used to recover ground-water samples for laboratory analyses. The samples were packed on ice and shipped to ARC for analyses (Appendix F).



On March 3 and 4, 1992, Canonie (under the supervision of Capsule) collected ground-water samples from the 20 ground-water monitoring wells located at the site. Prior to sampling, the wells were purged of at least three well casing volumes of water or until pH, temperature, and specific conductance were stabilized. The 2-inch diameter monitoring wells were purged using a HDPE bailer, while the 4-inch and 5-inch diameter monitoring wells were purged with a submersible pump. Purge water from the wells were contained on site in 55-gallon drums for future disposal. Ground-water samples were collected using dedicated HDPE disposable bailers. Twenty ground-water samples, an equipment rinsate sample, a trip blank, and a field duplicate were submitted to ARC for analyses (Appendix G).

## 5.0 FORMER PONDS ASSESSMENT SUMMARY

The following is a summary of the sediment and surface water assessment activities conducted in Pond 1 and former Ponds 2, 3, 4 and 5.

### 5.1 Sediment Assessment

Pond sediment assessment activities were performed at the site from 1984 to 1992. These activities included soil borings by EIS and Canonie in 1984, Harza in 1986, BEST in 1991, and Capsule in 1992. Laboratory analytical results are discussed in Section 7.3.

According to Torrington's "Environmental Assessment", March 11, 1985, EIS and Canonie obtained grab sediment samples from each of the five former ponds in 1984. The location of the samples collected by EIS are not documented (Appendix B). The sediment samples obtained by Canonie were collected at the inlet to each pond (Appendix A). The sampling methodology and procedures for collecting these samples are not documented.

In 1986, Harza obtained sediment samples from Ponds 4 and 5 at a depth of 10 inches using a soil probe. Sediment samples were collected at eight locations in Pond 4 and 12 locations in Pond 5. The sediment samples were composited for each pond and submitted to ERG for analyses. Soil sampling locations are not provided in Harza's assessment report (Appendix C).

BEST installed one soil boring in each of the five ponds in 1991 to further evaluate the condition of the pond sediments. The soil borings were advanced to the water table at depths of six to ten feet below ground surface using hollow stem augers. Sediment samples were collected at two-foot intervals using a split barrel sampler and screened with a Photovac Model 1-S55 GC photoionization detector (GC-PID) to measure the relative concentrations of VOCs. Soil samples from Ponds 4 and 5 were collected in 4-ounce glass containers and sent to NET for analyses (Appendix E).

In September 1991, Capsule advanced one soil boring in former Pond 4 using hollow stem augers to a depth of 10 feet below ground surface. The soil boring (PD4-1) was conducted near the outlet of the oil/water separator (also referred to as a concrete weir in previous assessment reports referenced in Section 1.3) and continuously sampled using a split barrel sampler. Each soil sample was screened with a PID as described in Section 3.2. One soil sample was packed in a 4-ounce glass container and shipped to ARC for analyses (Appendix F).

To further characterize the sediment in former Pond 4, Capsule supervised the installation of eight additional soil borings (PD4-2 through PD4-9) in February through April 1992 (Figure 8). The soil borings were advanced to 8 feet using a rotary drilling rig with hollow stem augers. Soil samples were collected continuously to a depth of 10 feet using a 24-inch long split barrel sampler. Each soil sample was screened with an HNU PID to measure the relative concentration of VOCs. The eight soil samples collected from the soil borings were shipped to ARC for analyses (Appendix G). The PID readings are summarized in Table 1. Soil boring logs for the soil borings conducted by Capsule are presented as Appendix J.

During the subsurface investigation at former Pond 4, Capsule observed a sludge layer at a depth of seven to eight feet in the center of the former pond. The sludge layer gradually decreased and was encountered at depths of 1.5 to 2 feet below the ground surface near what was judged to be the edge of the former pond.

## 5.2 Surface Water Assessment

Surface water samples were collected from the five ponds (Ponds 1, 2, 3, 4, and 5) by EIS in 1984. The sample collection procedures are not documented (Appendix B).

Canonie obtained additional surface water samples from each of the ponds (with the exception of Pond 3) in August 1984. Surface water samples were not collected from this pond at the time because it was dry. The surface water samples were submitted to Gulf Coast for analyses (Appendix A).

Each of the ponds, with the exception of Pond 1, were reportedly remediated and filled sometime between 1986 and 1990. The remedial techniques employed and type of fill material used are not documented.

## 6.0 ADDITIONAL ASSESSMENT SUMMARY

Additional assessment activities were performed at the site by BEST in August 1990. These activities include an assessment associated with the building paint and waste pits, and a discussion of the possible presence of asbestos. Additional assessment and remedial activities associated with these materials are being addressed by others under contract to UEA based on contractual agreements between Torrington and UEA.

### 6.1 Building Paint Assessment

In August 1990, BEST collected two paint chip composite samples from the main building (Figure 6). One composite sample each was collected from the machine shop and heat treat areas. Sampling methodology is not documented. The paint chips were submitted to ECI for analyses (Appendix D). Additional assessment and remedial activities associated with the building paint are being addressed by others under contract to UEA based on contractual agreements between Torrington and UEA.

### 6.2 Waste Pits Assessment

In August 1990, BEST collected 10 composite samples from 21 waste pits located inside the main building and submitted them to ECI for analyses. Sampling methodology is not documented. The contents of the waste pits were either oil, water, sludge, and sand. The locations where the samples were collected are identified in Figure 6 (Appendix D).

### 6.3 Asbestos Assessment

A site visit by Law in July 1992 identified ceiling material, which could be asbestos, in the foundry, solvent still building, and storage building. Samples of the ceiling material have not been collected. Additional assessment and remedial activities associated with this material are being addressed by others under contract to UEA based on contractual agreements between Torrington and UEA.

## 7.0 ANALYTICAL DATA SUMMARY

Laboratory analytical data for soil, ground-water, sediment, and surface water samples collected at the site from 1984 to 1992 are presented in the following sections. Additionally, analytical data from paint chip and waste pit samples collected inside the buildings are included. Laboratory data sheets for the analytical data summarized below are provided in Appendices A through G.

## 7.1 Soil Analytical Data

This section summarizes the soil analytical data obtained from soil boring activities by Canonie, BEST, and Capsule, floor corings by BEST, and the soil gas investigation by Tracer under Capsule's supervision.

### 7.1.1 Soil Boring Analytical Data

Soil samples collected by Canonie from soil borings W-1 through W-8, S-3, and A-1 through A-21 in July and October 1984, were analyzed by Gulf Coast. The soil samples were analyzed for volatile organic compounds (VOCs) and polychlorinated biphenyls (PCBs) using a hexane and acetone extraction. The VOCs analyses were performed using EPA Method 601 and 602 and the PCBs analyses were performed using a GC with an electron capture detector. The EPA method for analyzing PCBs is not referenced in Canonie's assessment report (Appendix A).

Table 3 lists the total volatile organic parameters which were analyzed for each soil sample by Gulf Coast using EPA Methods 601 and 602. Table 4 summarizes only the VOC parameters which were identified above detection limits. Generally, the highest levels of volatile organics were detected in soil samples collected from 6 to 8 feet below the ground surface and were located in the vicinity of the former waste oil tank and monitoring well S-3 at the southwest corner of the main building (the S-3 area). The compounds predominately detected were mineral spirits (a petroleum distillate), 1,1,1-Trichloroethane (1,1,1-TCA), and toluene (Appendix A).

The two soil samples collected near monitoring wells W-4 and S-3 by Harza in March 1986 were analyzed by ERG for VOCs using EPA Method 624. A list of analytes performed on the soil samples by ERG using EPA Method 624 is included as Table 5. Additionally, the soil sample collected near monitoring well S-3 was analyzed for semi-volatile organic compounds using EPA Method 625. Laboratory data sheets specifying the analytes performed on soil samples collected near S-3 using EPA Method 625 are not included in Harza's report (Appendix C).

Table 6 presents the VOCs and semi-volatile organic compounds identified above detection limits. Twenty-nine semi-volatile organic compounds were identified in the soil sample collected near S-3. The VOC exhibiting the highest concentration [(7.60 parts per million (ppm))] was 1,1,1-TCA, which was identified in the soil sample collected near monitoring well S-3 (Appendix C).

Soil samples M-1 and M-2 collected by BEST in January and February 1991 were analyzed by ERG for total metals. The metals included arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. The methodology used to analyze these parameters is not documented (Appendix E).

Table 7 presents the results of the metals analyses. Total metals concentrations were much higher in soil sample M-1 as compared to soil sample M-2. Total barium and total lead exhibited the highest concentrations. Concentrations of these constituents were 66.7 ppm and 76.6 ppm, respectively, in soil sample M-1. According to BEST's assessment report referenced in Section 1.3, it is likely that the soil collected as soil sample M-1 is not native to the site and may have been brought in during building construction (Appendix E).

Soil samples collected by Capsule from soil borings W-14A, W-14B, W-15A, and C1 in September 1991, were analyzed by ARC for VOCs identified in the Minnesota Department of Health's (MDoH) 465D compound list using EPA Method 8240. A list of these parameters is included in Table 8. All VOC concentrations were below detection limits and are summarized in Table 9 (Appendix F).

Soil samples collected by Capsule from soil borings S3-1 through S3-9 and S3I-1 through S3I-4 in February 1992, were analyzed for VOCs using EPA Modified Method 8240 or EPA Methods 601 and 602. Selected soil samples were also analyzed for total petroleum hydrocarbons (TPH) using EPA Method 9071. The parameters analyzed using EPA Modified Method 8240 are summarized in Table 10 and those analyzed using EPA Methods 601 and 602 are summarized in Table 11 (Appendix G).

Initially, all soil samples were to be analyzed for low level VOCs using EPA Method 8240. Due to the levels of concentrations encountered in the soil samples, the purge and trap on the GC/mass spectrometer (GC/MS) became overloaded. Subsequently, all analyses were changed to standard soil detection limits. In order not to exceed holding times, soil samples S3-3 (collected from depths of 4 to 6 feet) and S3I-1 (collected from depths of 2 to 2.5 feet) were analyzed using EPA Methods 601 and 602.

Table 12 summarizes the soil analyses for soil borings S3-1 through S3-9 and S3I-1 through S3I-4 for VOCs identified above detection limits, and TPH. Due to the level of VOCs detected in the soil samples, an alternate reporting format was developed by ARC. Analytes reported in Table 12 as not detected (ND\*) indicates the analyte was positively identified by mass spectrometry but is less than 20% of the estimated quantitation limit (EQL). Quantitative values were reported for analytes down to approximately 25% of their EQL. In other words, the practical quantitation limit (PQL) was multiplied four times to arrive at an EQL (Appendix G).

The predominate compounds identified above detection limits were TPH, 1,1,1-TCA, trichloroethene (TCE), 1,1-Dichloroethene (1,1-DCE), 1,1-Dichloroethane (1,1-DCA), methylene chloride, and benzene, toluene, ethylbenzene and total xylenes (BTEX). The concentrations of these chlorinated compounds and petroleum hydrocarbon constituents are dispersed throughout the S-3 area and do not decrease or increase laterally or vertically in any general pattern. It appears that these concentrations are a result of multiple sources, such as leaks from underground piping and former USTs, and/or accidental spills.

#### 7.1.2 Soil Coring Analytical Data

Soil samples collected by BEST from the 31 soil corings in August and September 1990, were analyzed by ECI for Resource Conservation Recovery Act (RCRA) toxicity, ignitability, corrosivity, and reactivity characteristics, solvents, and PCBs. These analyses included: flashpoint using EPA Method 1010, pH using EPA Method 9040, paint filter using

EPA Method 9095, reactive sulfide using SW-846 Section 7.3.4.1, reactive cyanide using SW-846 Section 7.3.3.2, F-List Solvents using EPA Methods 8010 and 8020, E.P. Toxic Metals using EPA Method 1310 for extraction, and PCBs using EPA Method 8080. The EPA Methods used for metals analyses are not documented.

Table 13 summarizes the analyses of the floor corings. According to BEST's, "Environmental Assessment", October 1990, the constituents were not detected at levels which would be characterized as "hazardous" (Appendix D).

### 7.1.3 Soil Gas Analytical Data

Soil gas samples collected by Tracer under supervision by Capsule were field analyzed for: 1,1-DCA, 1,1,1-TCA, BTEX, TCE and total volatile hydrocarbon compounds (TVHC). Additionally, air samples were obtained during soil gas sampling to monitor the ambient air. The soil gas investigation report prepared by Tracer is provided as Appendix H. Table 14 summarizes the soil gas analytical data obtained by Tracer. BTEX concentrations above detection limits were not detected in any of the soil gas samples. Figures 1a through 1d of Appendix H, depict the isoconcentrations of 1,1-DCA, TCE, TVHC and 1,1,1-TCA in rooms A and B near the S-3 area. Figures 2a through 2d of Appendix H depict the isoconcentrations of 1,1-DCA, TCE, TVHC and 1,1,1-TCA in room C, which is located near monitoring well W-12. Refer to Figure 2 for the general sampling locations in reference to the main building.

As shown in Figures 1a through 1d (Appendix H), the highest concentration levels of 1,1-DCA, 1,1,1-TCA and TVHC in rooms A and B are near the former waste oil tank in the S-3 area. Elevated concentrations of TCE, TVHC and 1,1,1-TCA were also detected near the former cutting oil and fuel oil tanks directly south of monitoring well S-3. Figures 2a through 2d (Appendix H), indicate the highest concentrations of 1,1-DCA, TCE, 1,1,1-TCA and THVC in room C are in the eastern portion of the room.



Although soil gas data represents relative vapor concentrations in the vadose zone and does not conclusively identify and quantify VOC concentrations, it can indicate that the areas exhibiting the highest levels of VOC concentrations are possible source areas. The soil gas analytical data indicates that the area near monitoring well S-3 is a possible source area. The concentrations in room C indicate a source area which had not been previously identified and is likely contributing to the elevated VOC concentrations in monitoring well W-12. The isoconcentration maps (Appendix H) indicate that soil contamination is underneath the building.

## 7.2 Ground-water Analytical Data

In 1984, the two ground-water samples collected from the production wells (Torrington Wells No. 3 and 4) by EIS were analyzed for VOCs and PCBs. The name of the laboratory which analyzed these samples and the sampling methodology is not documented (Appendix B).

Ground-water samples collected from monitoring wells W-1 through W-5, W-7, W-8, and S-3, and the production wells by Canonie in September 1984 were analyzed by Gulf Coast for VOCs and PCBs. The VOCs were analyzed using EPA Methods 601 and 602, and PCBs using a GC with an electron capture detector. The analytical method used for analyzing PCBs is not documented. A hexane and methylene chloride extraction was performed on all ground-water samples prior to analyses (Appendix A).

The ground-water samples collected from monitoring wells W-2, W-4, W-5, W-7, and S-3 by Harza in April 1986 were analyzed by ERG for VOCs using EPA Method 624 (Appendix C).

In August 1990, BEST collected ground-water samples from monitoring wells W-1, W-4, and S-3. Ground-water samples were collected from monitoring wells W-1, W-4, and S-3 in September 1990. In October 1990, a ground-water sample was collected from monitoring well W-8. The ground-water samples were analyzed by ECI for priority pollutants, including VOCs using EPA Method 8240, semi-volatile organic compounds using EPA Method 8270,

total phenols using EPA Method 9065, total cyanide using EPA Method 9010, pesticides and PCBs using EPA Method 8080, and metals (EPA methods for metals analyses are not documented). The metals analyses were performed for antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc (Appendix D).

In January and February 1991, BEST submitted ground-water samples from monitoring wells W-1 through W-5, W-7 through W-13, and S-3 to ECI for analyses of arsenic, chromium, lead, and VOCs (EPA Method 8240). The EPA methods used for metals analyses are not documented. Ground-water samples collected from monitoring wells S-3, W-7, W-9, and W-12 were also submitted to NET for the same analyses (Appendix E).

In September 1991, ground-water samples collected from monitoring wells W-14A, W-14B, W-15A, and W-15B by Canonie under contract to Capsule, were analyzed by ARC for VOCs according to MDoH's 465D compound list using EPA Method 8240 (Appendix F).

In March 1992, Canonie, under contract to Capsule, collected ground-water samples from the 20 monitoring wells on site. These ground-water samples were analyzed by ARC for VOCs using EPA Modified Method 8240 (Appendix G). Table 15 presents a summary of the VOC parameters identified above detection limits for the ground-water samples collected by the five consultants from 1984 to 1992. As discussed in Section 4.2, 16 of the 20 monitoring wells were installed without a sand pack or bentonite plug. Each monitoring well should follow consistent construction details and have discrete screened intervals which monitor a specific zone of interest. Without a sand pack or bentonite plug, the screened interval generally lacks consistency in the homogeneity of the material surrounding the well screen. This may produce inconsistent physical and chemical properties between the chemical concentrations and the surrounding material which may affect a ground-water sample's constituent concentration. Additionally, the annulus of a monitoring well will sometimes create a conduit which could contribute to or hasten the spread of the suspect parameters. Therefore, although the presence of VOCs can be identified, concentrations may not be representative and may not be accurately quantified. Although this data may not be truly representative, an attempt has been made to assess whether general trends, such

as increasing concentrations of certain compounds, can be identified. The data collected by Canonie under contract to Capsule is the only sampling event which includes all of the monitoring wells on site. From the latest sampling event in March 1992, VOCs were identified in all monitoring wells, with the exception of monitoring wells W-2, W-9, W-10A, and W-11A. Monitoring well S-3 exhibited the highest levels of VOCs, including 1,1,1-TCA (390 ppb), 1,1-DCA (450 ppb), 1,1-DCE (50 ppb), and vinyl chloride (43 ppb).

Figure 9 illustrates the transformation pathways for the chlorinated constituents identified in the ground-water samples. Vinyl chloride and chloroethane, which were identified in ground-water samples from monitoring well S-3, indicate that degradation of one or more chlorinated compounds has probably occurred in this area. Table 16 illustrates the solubility and mobility class for selected compounds which have been identified at the site.

Concentrations of the chlorinated compounds identified above are present in the upper nested monitoring wells W-10B, W-11B, and W-14B which are screened in 10 foot sections between 18 feet to 41 feet below ground surface. These compounds were at trace or non-detectable concentrations in the lower nested monitoring wells W-10A, W-11A, and W-14A (screened in 10 foot sections between 45 feet to 59 feet). Because the specific gravities of these constituents are greater than water (i.e., dense nonaqueous phase liquids or "DNAPLs"), these compounds and their products of degradation may be present at varying depths throughout the site depending upon the site geology and the concentrations.

Based on the VOC concentrations present in monitoring wells W-12 and W-10B, other source areas, in addition to the S-3 area, are potentially present in the subsurface.

Table 17 presents a summary of additional analytical data for ground-water samples collected from the monitoring wells by various consultants from 1984 to 1992. These compounds consist of PCBs, semi-volatile organic compounds, total phenols, pesticides, total cyanide, and metals. Limited data has been collected to assess whether these compounds are present in the ground water at the site. Elevated metal concentrations of lead and/or

chromium were identified in ground-water samples from monitoring wells W-1 and S-3 in August 1990. Resampling of the same monitoring wells in September 1990 indicated significantly lower concentrations. Laboratory data sheets for all ground-water analyses are presented in Appendices A through G.

### 7.3 Former Ponds Analytical Data

The following is a summary of the sediment and surface water samples collected from Pond 1 and former Ponds 2 through 5 by EIS and Canonie in 1984, Harza in 1986, BEST in 1991, and Capsule in 1992. Ponds 2 through 5 were reportedly remediated and filled at an unknown date.

#### 7.3.1 Sediment Analytical Data

As described in Section 5.1, the sediment samples collected by EIS from Ponds 1 through 5 were analyzed for VOCs and PCBs. The name of the laboratory and the analytical methods are not documented (Appendix B).

Sediment samples collected by Canonie from Ponds 1 through 5 in August 1984, were analyzed by Gulf Coast for VOCs using EPA Methods 601 and 602, and PCBs using a GC with an electron capture detector. The analytical method used for analyzing PCBs is not documented. Prior to PCB analyses, all sediment samples were extracted using hexane and acetone (Appendix A).

Composite sediment samples from Ponds 4 and 5 were collected by Harza in May 1986. Each sediment sample was analyzed for VOCs using EPA Method 624 (Appendix C).

In February 1991, BEST collected one sediment sample from each pond for analyses by ECI for VOCs using EPA Method 8240 (Appendix E).

Capsule collected one sediment sample from former Pond 4 in September 1991. The sediment sample was analyzed by Aspen for VOCs according to MDoH's Method 465D compound list using EPA Method 8240, TPH using EPA Modified Method 9071, cyanide using EPA Method 9010, mercury using EPA Method 7470, and arsenic, cadmium, chromium, copper, lead, nickel and selenium using EPA Method 6010 (Appendix F).

Capsule collected eight additional sediment samples from former Pond 4 in April 1992. Each of the sediment samples were analyzed by ARC for VOCs using EPA Method 8240, whereas selected sediment samples were analyzed for additional parameters. The additional parameters include cyanide using EPA Method 9010, TPH using EPA Modified Method 9071, mercury using EPA Method 7470, selenium using EPA Method 7740, silver using EPA Method 7760, and arsenic, barium, cadmium, chromium and lead, using EPA Method 6010 (Appendix G).

Table 18 presents a summary of the VOC parameters identified above detection limits in sediment samples collected by the various consultants from 1984 to 1992. Because the sediment samples were collected over a period of eight years, analyzed by different laboratories using various procedures and collected from different locations and depths inside each pond, variability in test results would be expected. However, certain compounds were consistently detected in the sediment samples. Methylene chloride has consistently been identified in a number of the sampling events from 1984 to the most recent event in 1992. Acetone was identified in five of the nine sediment samples collected from former Pond 4 by Capsule. Chloroform and BTEX concentrations were identified in the sediment samples collected by Capsule in 1992; however, these concentrations were below estimated quantitation limits. Concentrations of 1,1,1-TCA ranging from 830 to 70,000 ppb and 1,1-DCA ranging from 100 to 1,900 ppb were identified in sediments collected from former Pond 4 in sampling events prior to 1992; however, these compounds were not present above detection limits in the ten sediment samples collected since 1991.

Table 19 presents a summary of additional analytical data for sediment samples collected from Pond 1 through 5. These analytes include PCBs, TPH, cyanide, and metals. TPH concentrations ranging from 4,900 ppm to 39,000 ppm were identified in sediment samples from former Pond 4 in 1991 through 1992. All of the metals analyzed from 1991 to 1992, except for silver, have been identified above detection limits in former Pond 4. The metals identified with the highest concentrations are lead (220 ppm) and copper (1,000 ppb). Laboratory analytical data sheets are presented in Appendices A, B, F and G.

### 7.3.2 Surface Water Analytical Data

Five surface water samples collected by EIS in 1984 from Ponds 1 through 5 were analyzed for VOCs. The laboratory and sampling methodology is not provided (Appendix B).

In August 1984, Canonie collected five surface water samples from Ponds 1 through 5 for analyses by Gulf Coast for VOCs using EPA Methods 601 and 602 and PCBs using GC with an electron capture detector. The EPA method used for PCB analyses was not identified in Canonie's assessment report. An extraction with hexane and methylene chloride was performed on all samples (Appendix A).

Table 20 presents a summary of the PCB analyses and the VOCs identified above detection limits. The surface water samples collected by EIS in 1984 indicated the presence of VOCs, including 1,1,1-TCA, 1,1-DCA, tetrachloroethene, and methylene chloride. No VOCs were detected in the subsequent surface water samples collected by Canonie. Methylene chloride was the constituent exhibiting the highest levels with concentrations ranging from 9.7 ppb to 32 ppb.

### 7.4 Building Paint and Waste Pits Analytical Data

Laboratory analytical data for paint chip and waste pit samples are presented in the following sections. Laboratory analytical data sheets are presented in Appendix D.

#### 7.4.1 Building Paint Analytical Data

Two composite samples of paint (samples PP1 and PP2) were collected by BEST on behalf of UEA in August 1990, and analyzed by ECI for the RCRA Toxicity Characteristic (TC) metals (arsenic, barium, cadmium, chromium, lead, mercury, silver, and selenium). Laboratory analytical data is presented in Table 21. Composite sample PP2, collected from the machine shop, exhibited a TC lead concentration of 32.2 ppm (Appendix D).

#### 7.4.2 Waste Pits Analytical Data

Ten composite samples were collected from the waste pits located inside the main building by BEST on behalf of UEA in 1990 and analyzed by ECI for hazardous waste characteristics, solvents, and PCBs. These analyses included flash point, pH, paint filter, reactive sulfide, reactive cyanide, F-List (RCRA hazardous waste) solvents, PCBs, and the eight TC metals. Table 22 summarizes the analytical data. Waste pit sample P3 exhibited a concentration of 126 ppm for barium (Appendix D).

### 8.0 SUMMARY OF REMEDIAL ACTIVITIES

As discussed in Section 1.3, three USTs (the two 20,000-gallon fuel oil tanks and the 12,000-gallon cutting oil tank) and 1,600 cubic yards of soil were excavated and removed in 1986. Ponds 2 through 5 were reportedly remediated and filled sometime between 1986 and 1990. The remedial techniques employed and type of fill material used are not documented.

According to Capsule, the only other remedial activities conducted at the site to date are removal of the waste pit contents and paint removal in the machine shop area of the main building by BEST under contract to UEA. Documentation concerning these activities has not been provided to Law at the time of this report.

Approximately 1,000 cubic yards of hydrocarbon impacted soil were excavated and disposed from former Pond 4 by Capsule in August and September 1992. Due to the extensive hydrocarbon impacted soil detected in this area during excavation, additional remedial investigation activities will be performed. Information concerning the methodology used for executing the excavation are not currently available to Law.

## 9.0 EVALUATION OF REMEDIAL ALTERNATIVES

After the site has been fully characterized, an appropriate and relevant remedial technology will be recommended for site clean-up. A list of preliminary remedial alternatives for soil and ground water are listed below.

### 9.1 Soil Remedial Alternatives

#### Excavation

Excavation of soils is normally performed when small quantities of impacted soils require treatment or disposal. By itself, excavation is a means of remediation as opposed to a treatment process because it only serves to move contaminated soil from one location to another. Excavated soil can be disposed in a landfill or treated on-site. Disposing of contaminated soils in landfills can increase remedial expenses due to transportation/disposal costs and regulatory considerations. Hidden costs which may prove to be a substantial burden to the generator is the liability associated with off-site disposal of the waste soils. In-situ remedial alternatives should be considered before the excavation option is selected to remediate large volumes of contaminated soil.



The following are methods of treating previously excavated soils:

### Incineration

Incineration, or the thermal destruction, is a destruction technology that can be used to treat soils. Soils, sludges, or liquid wastes are added to a high-temperature combustion chamber where organic compounds are burned and converted to CO<sub>2</sub>, H<sub>2</sub>O, and acid gases. Vapors leaving the combustion chamber are usually treated with air pollution control equipment to remove partially oxidized organic vapors. Permitting an incinerator can be a lengthy and expensive process, usually requiring a RCRA Part B permit.

### Land Farming

Land farming refers to the practice of spreading organics wastes over an area of land, then relying on natural microbial action to degrade the waste. Permits may be required for vapors, surface water run-off, odors, and dust associated with digging, storing, and feeding the soils.

### Chemical Reduction-Oxidation

Chemical reduction-oxidation (redox) is employed on solid or liquid waste streams to destroy hazardous components or convert these components to less hazardous forms. Redox processes are based on reduction-oxidation reactions between the waste components and added reactants, in which the oxidation state of one reactant is raised while that of another is lowered.

The chemical redox treatment process typically consists of initial pH adjustment, addition of redox reagents, mixing, and treatment to remove or precipitate the reduced or oxidized products.

The chemical redox process usually generates a solids/liquids effluent that requires further treatment. If the reduced components are still in a soluble form under system conditions, chemical precipitation methods must be employed to convert these components to an insoluble form. Following reduction and/or precipitation, the solids are be separated from the liquid by filtration, settling, or evaporation. Chemical oxidation reactions with organics

are frequently incomplete, requiring biological or carbon adsorption post treatment. When using the chemical reduction-oxidation techniques for treating chlorinated organics, a possibility of producing hydrogen chloride exists. Leach tests should be conducted on the residual solids to assess the need for stabilization before final disposal. The liquid effluent should be analyzed before discharge to ensure regulatory compliance.

### In-Situ Treatment

Rather than first excavating contaminated soils and treating the soils by on site unit processes or disposal off site, various remediation technologies exist to treat the soil in place to reduce the levels of contamination. In-situ technologies are becoming more popular as a more cost effective alternative as compared to excavation especially for contaminants below or adjacent to buildings of other structures. The following paragraphs describe several in-situ technologies.

### In-Situ Soil Flushing

In-situ soil flushing is a process in which contaminants are washed from the soil by water and an additive such as a water/surfactant solution. The contaminants are then collected by recovery wells and treated above ground. Soils lying above or below the water table can be treated by this process.

### In-Situ Bioremediation

In-situ bioremediation is the process of using bacteria to biodegrade organic compounds in soils. In-situ bioremediation of subsurface materials generally involves the stimulation of naturally occurring, or indigenous, microorganisms to degrade organic contaminants. The microorganisms are stimulated by the addition of nutrients. One method of introducing the nutrients is to augment a ground-water pump-and-treat system by pumping ground water from the aquifer, treating it to remove contaminants, and adding nutrients before reinjecting it into the aquifer. Water is withdrawn faster than it is reinjected, creating a pressure sink at the withdrawal point which hydraulically contains the contamination and increases the flow rate of nutrients through the aquifer.

The chlorinated compounds typically present at the South Bend site, such as 1,1,1-TCA and TCE, are resistant to aerobic biodegradation. However, these compounds may be degraded under anaerobic conditions involving reductive dehalogenation, where chlorine is replaced with hydrogen. One potential limitation of this technology is the potential for partial degradation to equally toxic, more highly mobile compounds. Prior to design, a treatability study should be conducted to evaluate the feasibility of this technology.

### Vacuum Extraction

Vacuum extraction consists of the removal of residual compounds by drawing clean air through a zone of contaminated soil. These contaminants desorb from the soil and are transported with the exhausted air. Continued flushing with clean air can result in a significant decrease in the concentrations of volatile compounds in the soil.

The basic components of a vacuum extraction system are extraction wells and a blower. Depending upon the vertical extent of contamination and concentrations, moisture separation and ground-water pumping may be required. Off-gas treatment may also be required to meet air discharge requirements. Vacuum extraction is most effective in permeable soils above the water table, such as the sand and gravel present at the site. A pilot study to assess the radius of influence should be conducted prior to implementation of this type of remedial system.

## 9.2 Ground-Water Remedial Alternatives

### In-Situ Biostimulation

Treatment of ground water and soil below the water table by in-situ biostimulation involves the addition of nutrients to the aquifer to enhance the degradation of the organics by indigenous soil microbes. The nutrients are added above ground to ground water from recovery wells and then reinjected. The recovery wells and reinjection wells are designed so that the water containing nutrients is circulated through the contaminated zone.

### Pump-and-Treat

Pump-and-treat remediation technology refers to the extraction of impacted ground water and subsequent treatment of the extracted ground water at the surface. Extraction of contaminated ground water is accomplished through the use of extraction wells which are installed at specified locations and depths to optimize contaminant recovery. Treated ground water may be discharged to injection wells that are positioned to enhance recovery by flushing contaminants toward extraction wells. Treated ground water may also be discharged to the local Publicly-Owned Treatment Works (POTW) or directly to surface water, which would require a National Pollution Discharge Elimination System (NPDES) permit. Pump-and-treat with reinfiltration or reinjection can be combined with in-situ soil treatment systems such as bioremediation or vapor extraction to recover compounds in both the vadose zone and ground water. An aquifer test should be performed at the site to assess the hydrologic properties of the aquifer.

After the ground water has been extracted, a number of treatment options may be considered depending on the contaminant requiring removal. Some forms of treatment typically performed on recovered ground water include air stripping, carbon adsorption, and biological treatment.

### Air Stripping

Air stripping is a process employed to remove VOCs from ground water. The basic concept of any air stripping facility is to bring the contaminated water into intimate contact with air, so that the VOCs undergo a phase change from liquid phase to vapor phase. This air will then transport the contamination, leaving the water free from these compounds. An air permit would most likely be required for air emissions.

### Carbon Adsorption

Adsorption is a natural process in which molecules of a liquid or gas are attracted to and then held at the surface of a solid. Carbon is an excellent adsorbent due to the large degree of surface area contained within the carbon particle which is accessible for adsorption process. Carbon treatment can be very expensive when high VOC concentrations are present due to costs for disposal and regeneration of the carbon canisters when they are spent.

### Biological Treatment

Biological treatment techniques used for municipal wastewater facilities can be scaled down and applied to removal of VOCs from ground water. Treatment techniques include fixed film and suspended growth biological processes. The most common fixed film biological processes are rotating biological contactors (RBC's), trickling filters, and bio-towers. In these technologies a thin growth of biological solids is maintained on artificial media which is exposed to process water by an induced flow. Oxygen for the aerobic bacteria is supplied by direct contact with the atmosphere.

Activated sludge treatment, which is a suspended growth process consisting of a large quantity of microorganisms maintained in a liquid environment, is perhaps the most common biological treatment technique utilized for ground-water remediation. Oxygen is provided by vigorous aeration which mixes the water and solids. The aeration tank discharges to a clarification chamber which separates the biological solids from the final effluent. A small portion of the settled sludge is returned to the reaction chamber to maintain the biological population, and the remainder of the sludge is compacted to remove moisture and sent to final disposal.

Biological systems are more complex than other treatment systems and require frequent sludge handling and disposal.

### Physical/Chemical Treatment

Physical/chemical treatment processes are often performed on recovered ground water for removal of metals or other inorganic contaminants. Chemical treatment is often used to control such parameters as pH, metals, cyanide, solids, etc. These processes are often coupled with physical treatment including mixing, clarification, gravity separation, and filtration to remove precipitated or suspended compounds.

## 10.0 CONCLUSIONS

### 10.1 General Comments

1. Remediation of this site will be guided under IDEM's voluntary clean-up program. Clean-up standards will be based on background levels, Drinking Water Standards, or may be negotiated by the applicant. IDEM has recommended that CERCLA RI/FS guidelines be consulted for informational and technical guidance in conducting future phases of work.
2. Before evaluating remedial technologies, the site must be fully characterized. Numerous assessment activities have been conducted at the site; however, source areas and lateral and vertical extent of contamination have not yet been fully defined.
3. Soil borings and previous assessment reports indicate that the site geology consists of sand and gravel underlain by shale bedrock at approximately 180 feet below ground surface. A clay layer approximately 20 to 30 feet thick is encountered at approximately 60 feet below the ground surface creating an upper and lower aquifer.

4. The clay layer reportedly acts as a confining unit dividing the aquifer into an upper unit averaging 60 feet in thickness and a lower unit approximately 90 feet in thickness. The clay is reportedly impermeable; however, boring logs from the Canonic and BEST reports describe the clay as stiff clay interspersed with sand and gravel.
5. The ground-water flow direction is toward the north. According to monitoring well gauging data collected by Capsule in 1992, the flow gradient is relatively flat.
6. Petroleum hydrocarbon constituents have been identified in the soil near the southwest corner of the building known as the S-3 area and former Pond 4.
7. Chlorinated compounds, predominantly 1,1,1-TCA, 1,1-DCA, 1,1-DCE, TCE, chloroethane, and vinyl chloride, are present in the soil and ground water underlying the site. 1,1,1-TCA will degrade over a period of time into TCE, 1,1-DCE and 1,1-DCA. These compounds degrade to vinyl chloride and chloroethane. These degradation compounds are classified as exhibiting high mobility, thereby increasing the opportunity for off-site migration.
8. The chlorinated compounds identified in item 7 above exhibit specific gravities greater than water, causing them to sink if released in high enough concentrations. Depending upon multiple sources and concentrations when released to the subsurface media, these compounds could potentially be present at varying depths throughout the site.
9. Clay lenses interbedded in the sandy gravel have been identified in boring logs prepared by other consultants and are typical of the regional geology. In a separate liquid state, the chlorinated compounds tend to adhere to these clay lenses, while a portion continues to migrate.

10. The only source area which has been identified is the S-3 area. Site drawings obtained from the facility indicate that underground piping from the floor drains inside the facility appeared to discharge into the former ponds. One drawing indicates that the piping from the building discharged into oil/water separators prior to discharge into the ponds. Leaks from these underground pipes, fractures in the floor of the building and pits, accidental spills, and former USTs containing solvents are likely source areas. Ground-water concentrations in monitoring wells W-10B and W-12 indicate the potential presence of additional source areas in addition to the S-3 area.

## 10.2 Soil

1. The soil gas investigation indicates the presence of 1,1-DCA, TCE, 1,1,1-TCA and THVC under the building. The highest concentrations are present in the S-3 area and a previously unidentified area close to monitoring well W-12. The soil gas investigation was not conducted in the northern part of the building or south of the building.
2. Based on soil samples from soil borings S3-1 through S3-9 and soil borings S3I-1 through S3I-4, conducted in February 1992, 1,1,1-TCA, 1,1-DCE, 1,1-DCA, TCE, BTEX, and methylene chloride were present in the subsurface at depths of 14 feet. Notes from the laboratory data sheets indicate that the presence of methylene chloride in some of the soil samples was introduced during laboratory analyses.
3. Based on analytical data from the soil borings identified in item 2, the concentrations of the chlorinated compounds and the petroleum hydrocarbons appear to be dispersed throughout the S-3 area and do not decrease or increase laterally or vertically in any general pattern. Approximately 1,600 cubic yards of soil and the former USTs were removed in 1986; however, the location and extent of excavation was not documented. Based on analytical



data, it appears that chlorinated compounds and petroleum hydrocarbon constituents detected in the soil in this area are potentially related to the former USTs, previous spills, or leaking underground pipes. The lateral and vertical extent of impact in the S-3 area has not been defined.

4. With the exception of the S-3 area, limited analytical data is available to characterize the site soil. Soil samples were not collected during installation of soil borings W-9 through W-13.
5. One soil sample from soil borings M-1 and M-2 was collected by BEST in 1990 and analyzed to assess background metals. Total lead and total chromium were detected at elevated concentrations in soil boring M-1. BEST reported that the soil from soil boring M-1 was not native to the site and was likely transported in during building construction. Additional analytical data to assess the presence of metals in the soil has not been obtained in previous assessment activities. This data is needed to assess background levels during establishment of clean-up guidelines under IDEM's voluntary clean-up program.
6. Soil samples from floor corings in the building were collected at depths of 18 inches by BEST in 1990 and analyzed for RCRA hazardous waste characteristics, solvents, and PCBs. Analyses indicated hazardous waste below regulatory levels. However, because the waste pits, underground drainage pipes, and USTs are typically present at depths greater than 18 inches, it is possible that compounds were present, but not detected.

### 10.3 Ground water

1. Monitoring wells S-3 and W-1 through W-14A were installed without a sand pack. In addition, monitoring wells W-1 through W-8 were installed without a bentonite plug. Without a sand pack or bentonite plug, these monitoring wells may produce unrepresentative samples for the depth interval being sampled and could potentially serve as a pathway for VOCs to vertically migrate (see Section 7.2).
2. Ground-water samples from the monitoring wells installed without a sand pack or bentonite plug may be used to identify the presence of VOCs; however, concentrations and vertical and lateral extent may not be representative and cannot be accurately quantified (see Section 7.2). These monitoring wells should not be used to monitor the ground-water quality under CERCLA RI/FS guidelines during the remedial action phase.
3. Ground-water analytical data from 1984 to 1992 was compiled into one table to assess if general trends, such as increasing concentrations in the direction of ground-water flow or evidence of increased degradation could be identified. Because no general trends could be identified and the March 1992 sampling event was the only event to include all the monitoring wells, most of the following conclusions were based on this March 1992 data.
4. During development of monitoring wells S-3, and W-1 through W-5 in 1984, Canonie removed 300 gallons of ground water from each monitoring well. Withdrawing this amount of water could create a cone of depression potentially drawing contaminants in from other areas of the site. (The September 1984 sampling event is the only event exhibiting compounds above detection limits in monitoring well W-2.)

5. Based on analytical data from the ground-water sampling event in March 1992, chlorinated compounds identified in Section 10.1.7 were present in all of the monitoring wells except monitoring wells W-2, W-9, W-10A, and W-11A.
6. Chlorinated compounds previously below detection limits were identified in monitoring wells W-11B, W-14A, W-15A, and W-15B, possibly indicating that the plume has migrated north. The lateral extent of the plume has not been assessed.
7. Concentrations of the chlorinated compounds identified in Section 10.1.7, are present in the upper nested monitoring wells W-10B, W-11B, and W-14B which are screened in ten foot sections between 18 feet to 41 feet below the ground surface. These compounds were not detected or exhibited trace concentrations in the lower nested monitoring wells W-10A, W-11A, and W-14A (screened in ten foot sections between 45 feet to 59 feet). Based on this information, the chlorinated compounds appear to be present above 41 feet in the north area of the plant. However, due to the nature of the chlorinated compounds and the improperly installed monitoring wells, the vertical extent cannot be accurately assessed in this area without more data. The vertical extent in the south area of the property has not been assessed.
8. Vinyl chloride, which was not present in ground-water sampling events from 1984 to 1990 in monitoring well S-3, was present in the last two sampling events. The presence of this compound indicates potential degradation of the VOCs is occurring.
9. Priority pollutants were analyzed on three monitoring wells (monitoring wells W-1, W-4, and S-3) by BEST in August 1990. No other sampling events have incorporated these compounds for analyses. Before evaluating remedial technologies, all constituents must reasonably be identified.

10. During the August 1990 sampling event, elevated chromium and lead concentrations were identified in monitoring wells W-1 and S-3. Resampling in September 1990 and February 1991 indicated significantly lower levels. Additional data is needed to assess the metal concentrations in the ground water.

#### 10.4 Former Ponds

1. All ponds, with the exception of Pond 1, were reportedly remediated and filled at an unknown date. The fill material is unknown.
2. Facility drawings indicate that floor drains and piping from inside the facility discharged into the former ponds. One drawing indicates that underground building piping discharged into oil/water separators prior to discharging into former Ponds 1 and 4.
3. BTEX and TPH were identified in former Pond 4. In addition, low to slightly elevated levels of metals and cyanide were identified. Approximately 1,000 cubic yards of hydrocarbon impacted soil were excavated and removed from former Pond 4 by Capsule in August and September 1992. Due to the extensive hydrocarbon impacted soil detected in this area during excavation, additional remedial investigation activities will be performed.
4. Limited assessment data has been collected from Ponds 1 and former Ponds 2, 3 and 5. Surface water samples collected from the ponds in 1984 indicated the presence of VOCs.

### 10.5 Other Areas Of Environmental Concern

1. Based on site reconnaissance by representatives from Law and Capsule, material which could possibly be asbestos was identified in the storage, foundry, and solvent still building. The presence of asbestos will be or has been addressed by consultants for UEA under contractual agreement between Torrington and UEA.
2. Based on information provided by Capsule, paint removal has only been conducted in the machine shop area. Sampling of the paint in all other areas of the building should be conducted to assess the potential presence of lead paint. Under contractual agreements between Torrington and UEA, consultants for UEA have or will address this item.
3. Production wells (Torrington Wells No. 3 and 4) are present at the site but are no longer used.

### 11.0 RECOMMENDATIONS

The following items are recommended:

1. The following paragraphs address conclusions 10.1.2, 10.1.10, 10.2.1, 10.2.3, 10.2.4, 10.2.5, 10.2.6, 10.3.2, 10.3.6, 10.3.7, 10.3.9, 10.4.3, and 10.4.4. Before a remedial system can be designed and implemented, the soil and ground water must be fully characterized. Characterization includes defining the source areas, identifying the contaminants, and assessing the lateral and vertical extent of impact. To achieve these objectives, Law recommends a phased approach from general to specific.

Law recommends performing a soil gas investigation throughout the site to assess potential source areas. Soil gas samples should be taken laterally until nondetectable levels are achieved. The soil gas investigation should generally indicate potential source areas and lateral extent in the vadose zone.

Based on the information obtained from the soil gas investigation, soil borings should be conducted and continuously sampled and analyzed to the top of the clay layer. This data should be used to assess the vertical extent of contamination in the soil and will provide analytical data to more conservatively quantify the concentrations of chlorinated constituents. Soil samples from the clay layer should be collected and analyzed to assess the permeability of this layer.

After the soil borings have been conducted, nested monitoring wells should be installed to assess the vertical extent of contamination in the ground water. Once the monitoring wells have been installed, the ground water should be sampled for the Clean Water Act priority pollutants. After the site has been fully characterized, remedial alternatives can be evaluated.

2. Based on conclusion 10.1.1, CERCLA RI/FS guidelines will be consulted for informational and technical guidance in conducting future phases of remedial investigation activities.
3. Based on conclusion 10.3.1, the 16 monitoring wells which are installed without a sand pack and bentonite plug should not currently be used for quantifying ground-water quality. These monitoring wells should currently be used only for informational purposes. (i.e., assessing ground-water depths during an aquifer test). During the course of the site characterization, the usefulness of the monitoring wells to provide various types of data should be evaluated. The monitoring wells which are deemed to be of no further use

should be properly abandoned. If the locations of these monitoring wells are desirable for future ground-water quality monitoring during the remedial action phase, properly constructed monitoring wells should be installed in the vicinity of the abandoned monitoring wells.

4. Based on conclusion 10.5.3, if Torrington Wells No. 3 and 4 will not be used in the future, the production wells should be properly abandoned or the aquifer characteristics and well construction details evaluated to assess whether a substantial risk exists for well operations to impair ground-water treatment alternatives or for the production well water to be subject to impact from subsurface organic or inorganic compounds.

**TABLES**







Table 1: Summary of Field Headspace Analyses of Soil Borings - Continued

Sample Depth (Feet)	Soil Boring										
	PD4-6 <sup>2</sup> (ppm)	PD4-7 <sup>2</sup> (ppm)	PD4-8 <sup>2</sup> (ppm)	PD4-9 <sup>2</sup> (ppm)	W-14A(1) <sup>1</sup> (ppm)	W-14A(2) <sup>1</sup> (ppm)	W-14B <sup>1</sup> (ppm)	W-15A <sup>1</sup> (ppm)	W-15B <sup>1</sup> (ppm)	C1 <sup>1</sup> (ppm)	
0-2	0.5	0.5	20	1	6.5	NS	NS	NS	NS	8.0	
2-4	5	1	20	20	3.0	NS	NS	NS	NS	15.0	
4-6	70	1	100	12	0.5	NS	0	31.0	NS	12.0	
6-8	7	0	5	1	4.0	NS	NS	NS	NS	4.0	
8-10	0	0	0	1	6.0	NS	NS	NS	NS	9.0	
10-12	BT	BT	BT	BT	NS	2.0	1.0	2.0	5.0	2.0	
12-14	-	-	-	-	NS	NS	NS	1.0	NS	5.0	
14-16	-	-	-	-	0.0	NS	0.7	1.0	NS	1.0	
16-18	-	-	-	-	NS	NS	NS	NS	7.0	0.5	
18-20	-	-	-	-	NS	NS	NS	NS	BT	0.4	
20-22	-	-	-	-	0.5	NS	2.0	1.0	-	0.1	
22-24	-	-	-	-	NS	NS	NS	NS	-	0.1	
24-26	-	-	-	-	0.0	NS	1.0	31.0	-	0.5	
26-28	-	-	-	-	NS	NS	NS	NS	-	1	
28-30	-	-	-	-	NS	NS	NS	NS	-	0.4	
30-32	-	-	-	-	0.3	NS	3.0	2.0	-	0.2	
32-34	-	-	-	-	BT	NS	NS	NS	-	0.1	
34-36	-	-	-	-	-	NS	5.0	0.1	-	0.0	
36-38	-	-	-	-	-	NS	NS	NS	-	0.0	
38-40	-	-	-	-	-	NS	NS	NS	-	0.0	
40-42	-	-	-	-	-	0.0	5.2	0.0	-	0.0	
42-44	-	-	-	-	-	BT	BT	NS	-	0.0	
44-46	-	-	-	-	-	-	-	0.0	-	0.0	
46-48	-	-	-	-	-	-	-	NS	-	0.1	

Table 1: Summary of Field Headspace Analyses of Soil Borings - Continued

Sample Depth (Feet)	Soil Boring									
	PD4-6 <sup>2</sup> (ppm)	PD4-7 <sup>2</sup> (ppm)	PD4-8 <sup>2</sup> (ppm)	PD4-9 <sup>2</sup> (ppm)	W-14A(1) <sup>1</sup> (ppm)	W-14A(2) <sup>1</sup> (ppm)	W-14B <sup>1</sup> (ppm)	W-15A <sup>1</sup> (ppm)	W-15B <sup>1</sup> (ppm)	C1 <sup>1</sup> (ppm)
48-50	-	-	-	-	-	-	-	NS	-	0
50-52	-	-	-	-	-	-	-	0.0	-	0.1
52-54	-	-	-	-	-	-	-	NS	-	0.1
54-56	-	-	-	-	-	-	-	1.0	-	0
56-58	-	-	-	-	-	-	-	NS	-	0
58-60	-	-	-	-	-	-	-	NS	-	0
60-62	-	-	-	-	-	-	-	0.1	-	0
62-64	-	-	-	-	-	-	-	0.0	-	0

Notes:

BT = Boring terminated at previous depth

NS = Not Sampled

- = Boring terminated above this sampling depth

\* = HNU Malfunctioned

Source: <sup>1</sup> Capsule, "Torrington Investigation Report", November 13, 1991

<sup>2</sup> Capsule, "Phase II Investigation Report, Volume 1", May 26, 1992

Prepared By/Date: CD / 9/17/92  
 Checked By/Date: M.D. / 8-31-92

**Table 2: Summary of Monitoring Well Construction**

Well Number	Datum Elevation <sup>1</sup> (Ft)	Ground Surface Elevation (Ft)	Depth of Boring (Ft)	Depth of Well (Ft)	Screen Interval (Ft - Ft)	Depth to Top of Sandpack (Ft)	Depth to Top of Bentonite (Ft)	Formation Screened
W-1	713.09	713.46	65.0	64	59 - 64	40*	NA	Upper Gravelly Sand/Clay <sup>2</sup>
W-2	712.59	712.42	37.0	37	32 - 37	5*	NA	Upper Sandy Gravel
W-3	712.59	712.90	62.0	61	56 - 61	40*	NA	Upper Sand with Gravel
W-4	712.90	710.31	34.0	33	28 - 33	5*	NA	Upper Gravel with Sand
W-5	713.32	712.33	35.0	35	30 - 35	5*	NA	Upper Gravel with Sand
S-3	710.12	710.38	24.0	24	19 - 24	5*	NA	Upper Sand with Gravel
W-7	714.02	713.30	31.8	31.8	26.8 - 31.8	8*	NA	Upper Sand some Gravel
W-8	713.71	713.30	59.3	59.3	54.3 - 59.3	9*	NA	Upper Sand some Gravel
W-9	714.71	712.52	58.5	54.56	44.56 - 54.56	9.2*	7.2	Upper Gravelly Sand
W-10A	714.53	712.64	60.0	58.51	48.51 - 58.51	8.1*	6.1	Upper Gravelly Sand/Clay <sup>3</sup>
W-10B	714.59	712.68	29.0	28.13	18.13 - 28.13	7.8*	5.8	Upper Gravel
W-11A	714.32	712.24	56.5	55.1	45.1 - 55.1	8.2*	6.5	Upper Gravel
W-11B	714.56	712.29	30.08	30.08	20.08 - 30.08	6.16*	4.16	Upper Gravel
W-12	712.83	713.05	29.81	29.81	19.81 - 29.81	7.0*	5.0	Upper Gravel
W-13	713.95	714.22	57.0	35.29	25.29 - 35.29	8.83*	6.83	Upper Gravel
W-14A	715.50	714.50**	59	59	49 - 59	30*	24	NS
W-14B	714.94	712.44**	41	41	31 - 41	29	27	Upper Gravel with Sand
W-15A	714.50	712.00**	60	32	22 - 32	20	18	Upper Sand and Gravel
W-15B	713.84	711.34**	18	18	8 - 18	6	4	Upper Sand and Gravel
W-16	715.30	ND	60	57	47 - 57	46	44	Upper Gravelly Sand

Table 2: Summary of Monitoring Well Construction - Continued

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Notes:

- <sup>1</sup> Top of monitoring well elevations from Peirce and Associates, Land Surveyors and Professional Engineers, South Bend, Indiana, survey dated October 10, 1992. Pierce and Associates File No. 912391.
- <sup>2</sup> Monitoring well screen set three feet into sandy clay layer.
- <sup>3</sup> Monitoring well screen set one foot into sandy clay layer.
- \*
- \*\* Indicates depth at which native, gravelly sand formation collapsed around monitoring well.
- \*\* Ground surface elevations have been approximated by Law Environmental by subtracting the PVC riser stickup length shown on the monitoring well completion diagrams from the surveyed top of casing elevations.
- NA - Not Applicable. Review of monitoring well installation diagrams indicated that a bentonite seal (plug) was not utilized.
- NS - Screened interval not sampled during well installation.
- ND - No Data. Monitoring well completion diagram unavailable at the time of this report.
- Monitoring wells W-1 through W-5, S-3, W-7 and W-8 installed under the supervision of Canonic Engineers.
- Monitoring wells W-9 through W-13 installed under the supervision of BEST Environmental, Inc.
- Monitoring wells W-14A, W-14B, W-15A, W-15B and W-16 installed under the supervision of Capsule Environmental Engineering, Inc.
- Ground surface elevations for monitoring wells W-1 through W-13 and S-3 have been summarized from monitoring well completion diagrams provided. These elevations were not obtained during the Peirce and Associates survey of October 1991.

Prepared By/Date: CJD / 9-7-92  
Checked By/Date: MGD / 8/31/92

**Table 3: VOCs Analyzed By Gulf Coast Laboratories  
Using EPA Methods 601 and 602**

Acrolein	1,2-Dichloropropane
Acrylonitrile	1,1-Dichloroethylene
Benzene	1,3-Dichloropropylene
Bis (Chloromethyl) Ether	Ethylbenzene
Bromoform	Methyl Bromide
Carbon Tetrachloride	Methyl Chloride
Chlorobenzene	Methylene Chloride
Chlorodibromomethane	Tetrachloroethylene
Chloroethane	1,1,2,2-Tetrachloroethane
2-Chloroethylvinyl Ether	Toluene
Chloroform	1,2-trans-Dichloroethylene
Dichlorobromomethane	1,1,1-Trichloroethane
Dichlorodifluoromethane	1,1,2-Trichloroethane
1,1-Dichloroethane	Trichloroethylene
1,2-Dichloroethane	Trichlorofluoromethane
	Vinyl Chloride

Source: Canonie, "Environmental Assessment", 1984

Prepared By/Date: CJD / 9/8/92  
 Checked By/Date: CHC / 8/27/92

**Table 4: Summary of Soil Analyses for VOCs Identified Above Detection Limits and PCBs  
Soil Borings W-1 through W-8, S-3, and A-1 through A-21  
July and August 1984**

Soil Boring/ Depth	Mineral Spirits (ppm)	1,1,1 Trichloro- ethylene (ppm)	1,1,1 Trichloro- ethane (ppm)	1,1 Dichloro- ethylene (ppm)	1,1 Dichloro- ethane (ppm)	1,1,2,2 Tetrachloro- ethane (ppm)	Benzene (ppm)	Toluene (ppm)	Dibromochloro- methane (ppm)	Methylene Chloride (ppm)	Chloroform (ppm)	Bromoform (ppm)	PCBs (ppm)
W-1 10.0-11.5	230	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	<5
W-2 4.0-5.0	550	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	<5
W-2 8.5-10.5	1,730	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	<5
W-3 9.0-10.5	680	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	<5
W-4 0.0-.25	9,000	ND	ND	ND	ND	ND	0.17	ND	NA	ND	ND	ND	<5
W-4 0.5-1.5	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	<5
W-4 3.5-4.5	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	<5
W-5 2.0-3.0	740	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	<5
W-7 5.0	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<5
W-7 8.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<5
W-8 -	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
S-3 0.2-1.2	850	ND	500	ND	ND	ND	ND	24	NA	ND	ND	ND	<5



Table 4: Summary of Soil Analyses for VOCs Identified Above Detection Limits and PCBs - Continued

Soil Boring/ Depth	Mineral Spirits (ppm)	1,1,1 Trichloro- ethylene (ppm)	1,1,1 Trichloro- ethane (ppm)	1,1 Dichloro- ethylene (ppm)	1,1 Dichloro- ethane (ppm)	1,1,2,2 Tetrachloro- ethane (ppm)	Benzene (ppm)	Toluene (ppm)	Dibromochloro- methane (ppm)	Methylene Chloride (ppm)	Chloroform (ppm)	Bromoform (ppm)	PCBs (ppm)
S-3 3.0-4.0	2,100	ND	19,000	ND	ND	ND	ND	57	NA	ND	ND	ND	<5
S-3 5.0-6.0	32,000	ND	440	ND	ND	ND	ND	340	NA	ND	ND	ND	<5
S-3 7.0-8.5	1,220	ND	ND	ND	ND	ND	ND	360	NA	ND	ND	ND	<5
A-1 1.0-2.0	4,300	ND	14,000	ND	ND	ND	ND	120	NA	ND	ND	ND	<5
A-1 5.0-6.0	6,700	ND	100,000	ND	ND	ND	ND	520	NA	ND	ND	ND	<5
A-2 1.0-2.0	2,900	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	<5
A-2 5.5-6.5	2,620	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	<5
A-3 1.0-2.0	550	ND	ND	ND	ND	ND	ND	1,300	NA	ND	ND	ND	<5
A-4 2.5-3.5	670	ND	ND	ND	ND	ND	ND	880	NA	ND	ND	ND	<5
A-4 5.5-6.5	9950	ND	15,300	ND	1,270	ND	ND	ND	NA	ND	ND	ND	<5
A-5 1.0-2.0	3,960	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	<5
A-5 5.0-6.0	3,210	ND	5,770	ND	ND	ND	ND	ND	NA	ND	ND	ND	<5
A-6 1.0-2.0	2,020	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	ND





Table 4: Summary of Soil Analyses for VOCs Identified Above Detection Limits and PCBs - Continued

Soil Boring/ Depth	Mineral Spirits (ppm)	1,1,1 Trichloro- ethylene (ppm)	1,1,1 Trichloro- ethane (ppm)	1,1 Dichloro- ethylene (ppm)	1,1 Dichloro- ethane (ppm)	1,1,2,2 Tetrachloro- ethane (ppm)	Benzene (ppm)	Toluene (ppm)	Dibromochloro- methane (ppm)	Methylene Chloride (ppm)	Chloroform (ppm)	Bromoform (ppm)	PCBs (ppm)
A-16 5.5	1.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<5
A-16 8.5	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<5
A-17 2.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<5
A-17 5.5	120	ND	ND	11	ND	ND	93	9.3	ND	ND	15	ND	<5
A-17 8.5	80	9.9	ND	ND	6.6	ND	24	1.9	ND	ND	ND	ND	<5
A-18 2.5	61	ND	ND	7.1	ND	ND	ND	ND	ND	ND	ND	ND	<5
A-18 5.5	21	ND	ND	ND	ND	ND	27	ND	ND	ND	ND	ND	<5
A-18 8.5	175	79	ND	ND	18	ND	92	4.1	ND	ND	ND	ND	<5
A-19 2.5	330	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<5
A-19 5.5	235	ND	ND	30	19	ND	ND	ND	ND	ND	ND	39	<5
A-19 8.5	220	18	ND	ND	ND	ND	ND	1.0	ND	ND	ND	ND	<5
A-20 2.5	540	27	ND	39	ND	ND	8.6	6.2	ND	ND	73	44	<5

Table 4: Summary of Soil Analyses for VOCs Identified Above Detection Limits and PCBs - Continued

Soil Boring/ Depth	Mineral Spirits (ppm)	1,1,1 Trichloro- ethylene (ppm)	1,1,1 Trichloro- ethane (ppm)	1,1 Dichloro- ethylene (ppm)	1,1 Dichloro- ethane (ppm)	1,1,2,2 Tetrachloro- ethane (ppm)	Benzene (ppm)	Toluene (ppm)	Dibromochloro- methane (ppm)	Methylene Chloride (ppm)	Chloroform (ppm)	Bromoform (ppm)	PCBs (ppm)
A-20 5.5	5.3	ND	ND	15	ND	ND	ND	ND	ND	ND	ND	15	<5
A-20 8.5	45	ND	ND	14	8.4	ND	ND	ND	ND	ND	ND	12	<5
A-21 2.5	66	ND	ND	ND	6.7	ND	ND	ND	ND	ND	ND	ND	<5

NOTES:

ND = Not detected above practical quantitation limits (PQLs) shown on laboratory data sheets

VOCs = volatile organic compounds

PCBs = polychlorinated biphenyls

ppm = parts per million

NA = Not analyzed

NS = Not sampled

- = Not applicable

All soil samples for VOCs were extracted with hexane and acetone prior to analyses.

The VOCs were analyzed using EPA Methods 601 and 602. The PCB analyses were performed using a gas chromatograph with an electron capture detector. This table summarizes only volatile organic compounds identified above detection limits. Refer to Table 3 for a complete list of parameters analyzed using EPA Methods 601 and 602.

Source: Torrington, "Environmental Assessment", March 11, 1985

Prepared By/Date: CJD / 9792  
 Checked By/Date: MGD / 8-31-92

**Table 5: VOCs Analyzed by Environmental Research Group (ERG)  
Using EPA Method 624**

Benzene	Methylene Chloride
Carbon Tetrachloride	Chloromethane
Chlorobenzene	Bromomethane
1,2-Dichloroethane	Bromoform
1,1,1-Trichloroethane	Bromodichloromethane
1,1-Dichloroethane	Chlorodibromomethane
1,1,2-Trichloroethane	Tetrachloroethane
1,1,2,2-Tetrachloroethane	Toluene
Chloroethane	Trichloroethene
2-Chloroethylvinyl Ether	Vinyl Chloride
Chloroform	Acetone
1,1-Dichloroethene	2 Butanone
trans-1,2-dichloroethene	Carbon Disulfide
1,2-Dichloroethene	2-Hexanone
Trans-1,3-dichloropropene	4-Methyl-2-pentanone
cis-1,3-Dichloropropene	Styrene
Ethylbenzene	Vinyl Acetate
	Total Xylenes

Source: Harza, "Environmental Assessment", June 1986

Prepared By/Date: CD / 9-7-92  
 Checked By/Date: CHL / 8-31-92

**Table 6: Summary of Soil Analyses for Compounds Identified Above Detection Limits  
Soil Borings Near Monitoring Wells S-3 and W-4  
March 1986**

<b>Sample Identification</b>	<b>S-3</b>	<b>W-4</b>
<b>Depth (Feet)</b>	<b>(5-6)</b>	<b>(0-1)</b>
<b>Sample Date</b>	<b>3/86</b>	<b>3/86</b>
<b>Parameter</b>	<b>(ppm)</b>	<b>(ppm)</b>
1,1,1-Trichloroethylene	<0.01	ND
1,1,1-Trichloroethane	7.60	ND
1,1-Dichloroethylene	0.160	ND
1,1-Dichloroethane	0.068	ND
Tetrachloroethane	0.017	0.005
Benzene	0.022	0.012
Toluene	0.033	ND
Methylene Chloride	0.068	0.031
Acetone	<0.020	ND
cis (2-ethyhexyl) phthalate	<7.600	NA
Phanathrene	<7.600	NA
2-Methylnaphthalene	<7.600	NA
cis-1-Ethyl-3-Methylcyclopentane	0.280	NA
1,1,3-Trimethylcyclohexane	0.240	NA
1,2,3-Trimethylcyclohexane	0.540	NA
1-Methylethylcyclohexane	0.320	NA
1-Undecene	0.130	NA
Total Unknown Cyclohexanes	3.360	NA
4-Methyloctane	0.180	NA
Decane	2.000	NA
Unknown Hydrocarbon C6 to C16	7.100	NA
2,6-Dimethyl Undecane	7.000	NA
2,3,7-Trimethyl Octane	6.200	NA
Unknown Methyl Naphthalene	4.100	NA
Unknown Hydrocarbon C9 to C19	6.100	NA

**Table 6: Summary of Soil Analyses for Compounds Identified Above Detection Limits - Continued**

Sample Identification	S-3	W-4
Depth (Feet)	(5-6)	(0-1)
Sample Date	3/86	3/86
Parameter	(ppm)	(ppm)
Unknown Ethyl Naphthalene	4.900	NA
2,7-Dimethyl Naphthalene	13.000	NA
1,7-Dimethyl Naphthalene	13.000	NA
Unknown Hydrocarbon C10 to C20	8.300	NA
2-(1-Methylethyl) Naphthalene	5.300	NA
Total 1,6,7-Trimethyl Naphthalenes	11.400	NA
2,3,6-Trimethyl Naphthalene	6.600	NA
Unknown Hydrocarbon C12 to C22	1.100	NA
Unknown Hydrocarbon C13 to C23	8.100	NA
Unknown Hydrocarbon C14 to C24	6.200	NA
Unknown Hydrocarbon C15 to C25	12.000	NA
Unknown Hydrocarbon C18 to C28	6.400	NA
Total Unknowns - not in EPA/NIH Library	0.830	NA

Notes:

- ND = Not detected above practical quantitation limits (PQLs) shown on laboratory data sheets in Appendix C
- NA = Not analyzed
- ppm = parts per million

The soil borings were analyzed for volatile organic compounds using EPA Method 624 and semi-volatile organic compounds using EPA Method 625. This table summarizes only the volatile and semi-volatile organic compounds identified above detection limits. Refer to Table 5 for a complete list of volatile organic compounds analyzed using EPA Method 624.

Source: Harza, "Environmental Assessment", June 1986

Prepared By/Date: CJD / 9/6/02  
 Checked By/Date: CHC / 8/27/12



**Table 7: Summary of Soil Analyses for Metals  
Soil Samples M-1 and M-2  
February 1991**

Sample Identification	M-1	M-2
Sample Date	2/91	2/91
Parameter	(ppm)	(ppm)
Total Arsenic	2.94	2.14
Total Barium	66.7	<3
Total Cadmium	0.38	<0.2
Total Chromium	10.8	4.6
Total Lead	76.6	<3
Total Mercury	<0.1	<0.1
Total Selenium	<0.2	<0.2
Total Silver	<0.2	<0.2

Notes:

ppm = part per million

< = less than

Source: BEST, "Subsurface Environmental Assessment and Remedial Action Plan",  
April 1991

Prepared By/Date: CJD / 2-6-92  
Checked By/Date: MGD / 8-31-92

**Table 8: Minnesota Department of Health Method 465D Compound List using EPA Method 8240**

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Dichlorodifluoromethane	trans-1,3-Dichloropropene
Chloromethane	1,1,2-Trichloroethane
Vinyl Chloride	1,3-Dichloropropane
Bromomethane	Tetrachloroethene
Chloroethane	Dibromochloromethane
Dichlorofluoromethane	1,2-Dibromoethane
Trichlorofluoromethane	Chlorobenzene
Ethyl Ether	1,1,1,2-Tetrachloroethane
1,1,2-Trichlorotrifluoroethane	Ethylbenzene
Acetone	m,p & o-xylenes
1,1-Dichloroethene	Styrene
Allyl Chloride	Isopropylbenzene
Methylene Chloride	Bromoform
Methyl Tertiary Butyl Ether	1,1,2,2-Tetrachloroethane
trans-1,2-Dichloroethene	1,2,3-Trichloropropane
Methyl Ethyl Ketone	n-Propyl benzene
1,1-Dichloroethane	Bromobenzene
2,2-Dichloropropane	1,3,5-Trimethylbenzene
cis-1,2-Dichloroethene	2-Chlorotoluene
Chloroform	4-Chlorotoluene
Bromochloromethane	tert-Butyl benzene
Tetrahydrofuran	1,2,4-Trimethylbenzene
1,1,1-Trichloroethane	sec-Butylbenzene
1,1-Dichloropropene	p-Isopropyltoluene
Carbon Tetrachloride	1,3-Dichlorobenzene
1,2-Dichloroethane	1,4-Dichlorobenzene
Benzene	n-Butylbenzene

**Table 8: Minnesota Department of Health Method 465D Compound List using  
EPA Method 8240** **- Continued**

Trichloroethene	1,2-Dichlorobenzene
1,2-Dichloropropane	1,2-Dibromo-3-Chloropropane
Bromodichloromethane	1,2,4-Trichlorobenzene
Dibromomethane	Hexachlorobutadiene
Methyl Isobutyl Ketone	Naphthalene
cis-1,3-Dichloropropene	1,2,3-Trichlorobenzene
Toluene	

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Source: Capsule, "Torrington Investigation Report," November 13, 1991

Prepared By/Date CJD / 9-7-92  
Checked By/Date MGO / 8-31-92

**Table 9: Summary of Soil Analyses For Soil Borings  
C1, W-14A, W-14B, and W-15A  
September 1991**

Soil Boring/Depth (Feet)	Volatile Organics (EPA Method 8240)* (ppb)
C1 (0-2)	ND
C1 (2-4)	ND
C1 (34-36)	ND
C1 (60-61)	ND
W-14A 2/L	ND
W-14B (10-12)	ND
W-15A (30-32)	ND
W-15B	NS
Trip Blank	ND
Rinsate	ND
Soil Blank	ND
Lab Blank	ND

Notes:

\* = Refer to Table 8 for a complete list of volatile organics analyzed using EPA Method 8240

ppb = parts per billion

ND = Not detected above practical quantitation limits (PQLs) shown on laboratory data sheets in Appendix F.

NS = Not sampled

Source: Capsule, "Draft Torrington Investigation Report," November 13, 1991

Prepared By/Date: CSD / 9-7-92  
Checked By/Date: MGD / 8-31-92

**Table 10: VOCs Analyzed By Aspen Research Corporation (ARC)  
Using EPA Modified Method 8240**

Chloromethane	Bromodichloromethane
Vinyl Chloride	2-Chloroethyl vinyl ether
Bromomethane	cis-1,3-Dichloropropene
Chloroethane	trans-1,3-Dichloropropene
Trichlorofluoromethane	1,1,2-Trichloroethane
Acetone	Tetrachloroethene
1,1-Dichloroethene	Chlorodibromoethane
Carbon disulfide	Bromoform
Methylene chloride	4-Methyl-2-pentanone
Acrylonitrile	Toluene
trans-1,2-Dichloroethene	2-Hexanone
1,1-Dichloroethane	Chlorobenzene
Chloroform	Ethylbenzene
1,2-Dichloroethane	m,p-Xylene
Vinyl acetate	o-Xylene
2-Butanone	Styrene
1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane
Carbon tetrachloride	1,3-Dichlorobenzene
Benzene	1,4-Dichlorobenzene
Trichloroethene	1,2-Dichlorobenzene
1,2-Dichloropropane	

Source: Capsule "Phase II Torrington Investigation Report, Volume I", May 26, 1992

Prepared By/Date: CD / 9-7-92  
 Checked By/Date: ORC / 8-31-92

**Table 11: VOCs Analyzed By Aspen Research Corporation (ARC)  
Using EPA Methods 601 and 602**

Dichlorodifluoromethane	Bromodichloromethane
Chloromethane	2-Chloroethyl vinyl ether
Vinyl Chloride	cis-1,3-Dichloropropene
Bromomethane	trans-1,3-Dichloropropene
Chloroethane	1,1,2-Trichloroethane
Trichlorofluoromethane	Tetrachloroethene
1,1-Dichloroethene	Dibromoniomethane
Methylene Chloride	Chlorobenzene
trans-1,2-Dichloroethene	Bromoform
1,1-Dichloroethane	1,1,2,2-Tetrachloroethane
cis-1,2-Dichloroethene	1,3-Dichlorobenzene
Chloroform	1,4-Dichlorobenzene
1,1,1-Trichloroethane	1,2-Dichlorobenzene
Carbon Tetrachloride	Benzene
1,2-Dichloroethane	Toluene
Trichloroethene	Ethylbenzene
1,2-Dichloropropane	m,p,& o - xylenes

Source: Capsule, "Phase II Torrington Investigation Report, Volume I", May 26, 1992

Prepared By/Date: CD / 9-7-92  
 Checked By/Date: WLL / 8/31/92

**Table 12: Summary of Soil Analyses For VOCs Identified Above Detection Limits and TPH  
Soil Borings S3-1 Through S3-9, and S3I-1 Through S3I-4  
February 1992**

Soil Boring	S3-1	S3-2	S3-2	S3-3	S3-3f	S3-3	S3-4	S3-5	S3-6	S3-6 (DUP)	S3-6	S3-7	S3-8	S3-8 (DUP)
Depth (feet)	12-14	4-6	8-10	4-6	4-6	12-14	4-6	8-10	6-8	6-8	8-10	8-8.5	8-8.5	8-8.5
Parameter	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)
1,1-Dichloroethene	ND	ND	ND	3,100	220	ND	600	ND*	5,900	NA	ND*	ND	ND*	NA
Methylene Chloride	3,300	3,200	3,600	3,300	1,600**	2,900	3,300	3,300	3,300	NA	3,200	2,700	3,200	NA
Chloroform	ND*	ND*	ND*	ND*	ND	ND	ND*	ND*	ND	NA	ND*	ND*	ND	NA
1,1,1-Trichloroethane	ND	ND	800	42,000	9,500	660	12,000	3,600	55,000	NA	2,200	1,300	3,500	NA
o-xylene	ND*	ND	ND	1,200	see m,p-xylenes	ND	ND*	ND*	200	NA	ND*	370	330	NA
1,1-Dichloroethane	ND	ND	ND*	950	BPQL	920	410	150	1,000	NA	ND*	170	ND*	NA
Tetrachloroethene	ND	ND	ND	ND*	BPQL	ND	150	ND	150	NA	ND*	ND*	ND*	NA
Toluene	ND	ND	ND	400	360	ND	200	ND	ND*	NA	ND*	ND*	ND*	NA
m,p-xylene	ND*	ND	ND	800	4,300	ND*	ND*	ND	ND*	NA	ND*	170	190	NA
Acetone	1,200	ND	ND	ND	NA	880	1,100	ND	1,100	NA	ND	ND	ND	NA
Benzene	ND*	ND	ND	ND	BPQL	ND	ND*	ND	ND	NA	ND	ND	ND	NA
Trichloroethene	ND	ND	ND	ND*	ND	ND	ND*	ND	ND	NA	ND	520	ND*	NA
1,4-Dichlorobenzene	ND	ND	ND	ND	BPQL	ND	ND	ND	ND	NA	ND	ND	ND	NA
Ethylbenzene	ND*	ND	ND	ND	2,500	ND	ND	ND	ND	NA	ND	ND	ND	NA
Total Petroleum Hydrocarbons	1,100,000	NA	NA	NA	NA	NA	NA	NA	10,000,000	13,000,000	NA	NA	NA	10,000,000





Table 12: Summary of Soil Analyses For VOCs Identified Above Detection Limits and TPH  
Soil Borings S3-1 Through S3-9, and S3I-1 Through S3I-4 - Continued

Notes:

- ND = Not detected above practical quantitation limits (PQLs) shown on laboratory data sheets in Appendix G.
- ppb = parts per billion
- NA = Not analyzed
- EQL = estimated quantitation limit for EPA Method 8240
- PQL<sub>f</sub> = estimated quantitation limit for EPA Methods 601, 602 and 9071
- ND\* = compound was detected, but at a level less than 20% of EQL
- f = analyzed under EPA method 601 and 602 due to equipment malfunction
- \*\* = laboratory reagent contaminant
- VOCs = volatile organic compounds
- BPQL = below practical quantitation limit

All compounds were analyzed for volatile organics using EPA Modified Method 8240, except for soil samples S3-3 (4-6) and S3I-1 (2-2.5). These soil samples were analyzed using EPA Methods 601 and 602, due to equipment malfunction.

This table summarized only the VOCs identified above detection limits, and total petroleum hydrocarbons. Refer to Tables 10 and 11 for a complete list of VOCs analyzed using the methods referenced above.

Source: Capsule, "Phase II Torrington Investigation Report, Volume I", May 26, 1992

Prepared By/Date: CJD / 9.7.92  
Checked By/Date: MGD / 8/31/92

**Table 13 : Summary of Soil Analyses From Soil Corings  
September 1990**

Sample Identification	B-1	B-2	B-3	B-4	B-5	B-6	B-7	B-8	B-9	B-10	B-11
Date Collected	8/7/90	8/8/90	8/8/90	8/8/90	8/8/90	8/8/90	8/8/90	8/8/90	8/8/90	8/8/90	8/8/90
Parameter	Units										
Phenols, total	<0.166	<0.25	<0.25	<0.156	0.35	<0.23	<0.25	0.24	<0.215	<0.250	<0.250
Total React. Cyanide	<0.02	<0.02	<0.02	0.3	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total React. Sulfide	0.99	<0.49	<0.49	<0.49	0.49	<0.49	<0.49	0.99	0.99	<0.49	<0.49
Ignitability	>210	>210	>210	>210	>210	>210	>210	>210	>210	>210	>210
Paint Filter	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed
pH	8.6	8.1	7.95	7.68	7.35	8.25	6.77	7.93	8.85	8.44	7.7
F-List Solvent Scan	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total PCBs	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic (leachate)	0.005	0.006	0.004	0.005	*	0.004	0.003	0.002	0.003	0.006	<0.002
Barium (leachate)	<0.01	0.24	0.08	0.08	*	0.25	0.14	0.14	0.36	0.27	0.49
Cadmium (leachate)	0.007	0.004	<0.002	<0.002	*	0.004	0.002	0.002	0.003	0.004	0.003
Chromium (leachate)	<0.01	<0.01	<0.01	<0.01	*	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead (leachate)	<0.03	<0.03	<0.03	<0.03	*	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Mercury (leachate)	0.0003	<0.0002	<0.0002	<0.0002	*	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Selenium (leachate)	0.003	0.004	0.005	0.006	*	0.005	0.006	0.006	0.003	0.007	0.003
Silver (leachate)	0.015	0.013	<0.002	<0.002	*	0.003	<0.002	<0.002	0.012	0.019	0.003

Table 13: Summary of Soil Analyses From Soil Corings - continued

Sample Identification	B-12	B-13	B-14	B-15	B-16	B-17	B-18	B-19	B-20	B-21
Date Collected	8/8/90	8/8/90	8/8/90	8/8/90	8/8/90	8/8/90	8/8/90	8/8/90	8/8/90	8/8/90
Parameter	Units									
Phenols, total	<0.246	<0.248	<0.244	<0.183	<0.177	<0.157	<0.164	<0.153	<0.222	<0.165
Total React. Cyanide	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total React. Sulfide	0.49	0.49	4.5	1.49	<0.49	0.99	<0.49	1.49	<0.49	<0.49
Ignitability	>210	>210	>210	>210	>210	>210	>210	>210	>210	>210
Paint Filter	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed
pH	8.1	8.61	8.73	8.36	8.04	8.22	8.64	8.01	8.14	8.2
F-List Solvent Scan	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total PCBs	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic (leachate)	0.011	0.005	0.006	0.008	0.008	0.002	0.002	0.003	<0.002	<0.002
Barium (leachate)	0.14	0.15	0.17	0.15	0.13	0.07	0.08	0.04	0.05	0.21
Cadmium (leachate)	<0.002	<0.002	<0.002	<0.002	<0.002	0.004	0.004	0.002	<0.002	<0.002
Chromium (leachate)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	<0.01	<0.01	<0.01
Lead (leachate)	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Mercury (leachate)	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	0.0003	0.0003	0.0003	0.0003
Selenium (leachate)	0.005	0.004	0.005	0.006	0.004	0.003	0.004	0.003	<0.002	<0.002
Silver (leachate)	0.003	0.003	0.003	0.002	<0.002	0.002	0.003	<0.002	0.002	<0.002

Table 13: Summary of Soil Analyses From Soil Corings - continued

Sample Identification	B-22	B-23	B-24	B-25	B-26	B-27	B-28	B-29	B-30	B-31
Date Collected	8/10/90	8/10/90	8/10/90	8/10/90	8/10/90	8/10/90	8/10/90	8/10/90	8/10/90	8/10/90
Parameter	Units									
Phenols, total	<0.159	0.433	<0.142	0.573	<0.158	0.852	<0.157	<0.152	<0.154	<0.150
Total React. Cyanide	<0.02	<0.02	<0.02	<0.02	<0.02	<0.002	<0.02	<0.02	<0.02	<0.02
Total React. Sulfide	4.99	0.99	0.99	<0.49	2.49	<0.49	0.99	1.99	1.49	2.99
Ignitability	>210	>210	>210	>210	>210	>210	>210	>210	>210	>210
Paint Filter	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed
pH	8.76	7.41	8.06	7.43	7.72	6.06	7.42	8.06	8.36	8.19
F-List Solvent Scan	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total PCBs	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic (leachate)	<0.002	<0.002	0.004	0.003	0.003	0.003	0.013	0.002	0.002	0.003
Barium (leachate)	0.11	0.03	<0.01	0.18	<0.01	0.13	<0.01	<0.01	<0.01	<0.01
Cadmium (leachate)	<0.002	<0.002	0.003	<0.002	0.002	0.006	0.004	<0.002	0.002	<0.002
Chromium (leachate)	<0.01	<0.01	0.02	<0.01	0.05	0.06	0.02	<0.01	<0.01	<0.01
Lead (leachate)	<0.03	<0.03	<0.03	<0.03	<0.03	0.04	<0.03	<0.03	<0.03	<0.03
Mercury (leachate)	0.0003	0.0002	<0.0002	0.0002	0.0002	0.0003	0.0003	0.0002	0.0005	0.0002
Selenium (leachate)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Silver (leachate)	0.002	0.002	0.008	0.017	0.012	0.009	0.011	0.008	0.007	0.01

Notes:

ND = Not detected above practical quantitation limits (PQLs) shown on laboratory data sheets in Appendix D.

Passed = Samples contained no free liquids as defined and requested by 40 CFR 264.314 and 265.314.

ppm = parts per million

deg. F = degrees Fahrenheit

< = less than, > = greater than

\* = The laboratory data sheets with these analyses were not included in BEST's report.

Source: BEST, "Final Report Environmental Assessment", October 1990

Prepared By/Date: CJD / 9-6-92  
 Checked By/Date: MCD / 8/31/92

Table 14: Summary of Soil Gas Analytical Data  
April, 1992

Parameter		1,1-Dichloroethane	Trichloroethene	Benzene	Toluene	Ethylbenzene	Xylenes	Total Volatile Hydrocarbon Compounds	1,1,1-Trichloroethane
Unit		(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)
Soil Gas Sample	Collection Date								
AIR	04/27/92	<0.007	<0.0003	<0.03	<0.06	<0.2	<0.02	<0.2	0.009
SG-1-4'	04/27/92	0.01	<0.0006	<0.06	<0.1	<0.3	<0.4	<0.3	0.6
SG-2-5'	04/27/92	0.7	0.02	<0.06	<0.1	<0.3	<0.4	2	6
SG-3-5'	04/27/92	<0.01	<0.0006	<0.06	<0.1	<0.3	<0.4	0.9	0.004
SG-4-4'	04/27/92	5	2	<0.06	<0.1	<0.3	<0.4	17	13
SG-5-4'	04/27/92	3	0.1	<0.06	<0.1	<0.3	<0.4	2	0.2
SG-6-4'	04/27/92	64	0.1	<0.1	<0.3	<0.8	<1	1000	9
SG-7-4'	04/27/92	12	0.1	<0.6	<1	<3	<4	<3	0.2
SG-8-5'	04/27/92	0.1	0.06	<0.06	<0.1	<0.3	<0.4	<0.3	0.6
SG-9-4'	04/27/92	<0.07	<0.003	<0.1	<0.3	<0.8	<1	<0.9	<0.005
SG-10-4'	04/27/92	<0.01	0.002	<0.05	<0.1	<0.3	<0.4	<0.3	0.006
AIR	04/27/92	<0.007	<0.0006	<0.03	<0.06	<0.2	<0.2	<0.2	0.006
AIR	04/28/92	<0.01	<0.0005	<0.06	<0.1	<0.3	<0.4	<0.3	0.005
SG-11-5'	04/28/92	<0.05	<0.2	<0.3	<0.7	<1	<2	9	14
SG-12-5'	04/28/92	0.8	<0.09	<0.1	<0.3	<0.7	<0.9	7	6
SG-13-5'	04/28/92	5	<0.2	<0.1	<0.3	<0.7	<0.9	10	12
SG-14-5'	04/28/92	0.02	<0.09	<0.06	<0.1	<0.3	<0.4	7	5
SG-15-5'	04/28/92	<0.09	<0.005	<0.1	<0.3	<0.7	<0.9	4	8
SG-16-5'	04/28/92	31	<0.4	<0.1	<0.3	<0.7	<0.9	32	16
SG-17-5'	04/28/92	0.03	<0.005	<0.1	<0.3	<0.7	<0.9	5	8
SG-18-5'	04/28/92	4	<0.005	<0.1	<0.3	<0.7	<0.9	8	8
SG-19-5'	04/28/92	64	0.04	<0.1	<0.3	<0.7	<0.9	65	11
AIR	04/28/92	<0.01	<0.0005	<0.06	<0.1	<0.3	<0.4	3	0.01
AIR	04/28/92	<0.01	<0.0005	<0.05	<0.1	<0.2	<0.2	<0.2	NA

Table 14: Summary of Soil Gas Analytical Data - Continued

Parameter		1,1-Dichloroethane	Trichloroethene	Benzene	Toluene	Ethylbenzene	Xylenes	Total Volatile Hydrocarbon Compounds	1,1,1-Trichloroethane
Unit		(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)
Soil Gas Sample	Collection Date								
SG-20-5'	04/28/92	30	<2	<0.1	<0.2	<0.5	<0.7	60	67
SG-21-5'	04/28/92	62	<3	<0.1	<0.2	<0.5	<0.7	56	23
SG-22-5'	04/28/92	200	<11	<0.1	<0.2	<0.5	<0.7	1200	65
SG-23-5'	04/28/92	110	<0.08	<0.1	<0.2	<0.5	<0.7	500	45
SG-24-5'	04/28/92	0.1	<0.009	<0.1	<0.2	<0.5	<0.7	0.6	3
SG-25-5'	04/28/92	<0.07	<0.002	<0.1	<0.2	<0.5	<0.7	9	1
SG-26-5'	04/28/92	0.2	<0.3	<0.1	<0.2	<0.5	<0.7	5	5
AIR	04/28/92	<0.03	<0.0009	<0.04	<0.09	<0.2	<0.3	<0.3	<0.0001
AIR	04/29/92	<0.02	<0.0006	<0.5	<0.1	<0.2	<0.3	<0.3	0.002
SG-27-5'	04/29/92	0.1	<0.001	<0.03	<0.07	<0.01	<0.2	1	4
SG-28-5'	04/29/92	<0.04	0.7	<0.1	<0.3	<0.6	<0.7	7	4
SG-29-5'	04/29/92	1	<0.1	<0.1	<0.3	<0.6	<0.7	10	7
SG-30-5'	04/29/92	3	<0.06	<0.1	<0.3	<0.6	<0.7	4	6
SG-31-4'	04/29/92	<0.04	<0.001	<0.1	<0.3	<0.6	<0.7	1	4
SG-32-5'	04/29/92	0.9	0.1	<0.1	<0.3	<0.6	<0.7	<0.8	2
AIR	04/29/92	<0.01	<0.0006	<0.05	<0.1	<0.2	<0.3	<0.3	0.0008
SG-33-5'	04/29/92	0.3	<0.001	<0.1	<0.3	<0.6	<0.7	1	4
SG-34-5'	04/29/92	0.7	<0.001	<0.1	<0.3	<0.6	<0.7	<0.8	2
SG-35-5'	04/29/92	<0.04	<0.001	<0.1	<0.3	<0.6	<0.7	<0.8	1
SG-36-6'	04/29/92	0.5	<0.1	<0.1	<0.3	<0.6	<0.7	4	6
SG-37-5'	04/29/92	3	<0.1	<0.1	<0.3	<0.6	<0.7	10	7
SG-38-5'	04/29/92	13	0.02	<0.1	<0.3	<0.6	<0.7	4	4

Table 14: Summary of Soil Gas Analytical Data - Continued

Parameter		1,1-Dichloroethane	Trichloroethene	Benzene	Toluene	Ethylbenzene	Xylenes	Total Volatile Hydrocarbon Compounds	1,1,1-Trichloroethane
Unit		(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)
Soil Gas Sample	Collection Date								
SG-39-5'	04/29/92	<0.04	<0.001	<0.1	<0.3	<0.6	<0.7	7	0.04
SG-40-6'	04/29/92	120	<0.4	<0.1	<0.3	<0.6	<0.7	170	1
SG-41-6'	04/29/92	0.6	<0.07	<0.1	<0.3	<0.6	<0.7	4	6
AIR	04/29/92	<0.02	<0.0006	<0.05	<0.1	<0.2	<0.3	7	0.008
AIR	04/30/92	<0.02	<0.0006	<0.05	<0.1	<0.3	<0.4	0.8	0.006
SG-42-5'	04/30/92	71	<2	<0.1	<0.3	<0.7	<1	140	37
AIR	04/30/92	NA	NA	NA	NA	NA	NA	NA	0.008
SG-43-5'	04/30/92	100	<0.02	<0.2	<0.6	<1	<2	38	20
SG-44-5'	04/30/92	0.1	<0.001	<0.1	<0.3	<0.7	<1	1	0.2
SG-45-5'	04/30/92	36	0.1	<0.1	<0.3	<0.7	<1	14	1
SG-46-5'	04/30/92	<0.1	<0.003	<0.1	<0.3	<0.7	<1	<0.9	0.002
SG-47-5'	04/30/92	13	<0.4	<0.1	<0.3	<0.7	<1	23	13
AIR	04/30/92	<0.02	<0.0006	<0.05	<0.1	<0.3	<0.4	1	0.004

Notes:

ppb = parts per billion

SG-1-4' = soil gas sample 1 collected at a depth of four feet

NA = Not Analyzed

< = less than

All compounds were analyzed by Tracer using a field gas chromatograph (GC)

Source: Tracer Research Corporation, "Shallow Gas Investigation", April 1992

Prepared By/Date: CJD / 9/17/92  
 Checked By/Date: MEC / 8/27/92













Table 15: Summary of Ground-Water Analyses For VOCs Identified Above Detection Limits - Continued

Well Identification	T-4 1984 (2) (ppb)	T-4 7/84 (1) (ppb)
1,1,1-Trichloroethane	285	ND
1,1-Dichloroethane	65	ND
1,1-Dichloroethene	20	ND
Trichloroethene	ND	ND
Chloroethane	ND	ND
Vinyl Chloride	ND	ND
Toluene	ND	ND
trans-1,2-Dichloroethene	ND	ND
cis-1,2-Dichloroethene	NA	NA
Mineral Spirits	NA	ND
Chlorobromomethane	ND	ND
1,2-Dichloroethane	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Acetone	NA	NA
Perchloroethene	3.1	ND
Methylene Chloride	1.8	ND

Notes:

ND - Not Detected above practical quantitation limits (PQLs) shown on laboratory data sheets.

ppb = parts per billion

NA = Not Analyzed

< = less than

T-3 = Torrington Well No. 3

T-4 = Torrington Well No. 4

BEQL = Below estimated quantitation limits

(1) = Canonic, "Environmental Assessment," 1984

(2) = Torrington, "Environmental Assessment," March 11, 1985

(3) = Harza, "Environmental Assessment," June 1986

(4) = BEST, "Final Report Environmental Assessment," October 1990

(5) = BEST, "Subsurface Environmental Assessment and Remedial Action Plan," April 1991

(6) = Capsule, "Draft Torrington Investigation Report," November 1991

(7) = Capsule, "Phase II Torrington Investigation Report, Volume 1," May 26, 1992

Prepared By/Date ESD / 9-7-92  
 Checked By/Date MGD / 8-31-91

Table 16: Solubility and Mobility Class For Selected Compounds

Parameter	Solubility (ppm)	Mobility Class (ppm)
1,1-Dichloroethene	400	Moderate
1,1,1-Trichloroethane	700	Moderate
Trichloroethene	1,100	Moderate
Vinyl Chloride	2,670	High
1,1-Dichloroethane	5,100	Very High
Chloroethane	5,700	Very High
trans-1,2-Dichloroethene	6,300	Very High
1,2-Dichloroethane	8,450	Very High
Methylene Chloride	13,200	Very High

Note:

ppm = parts per million

Source: "EPA Memorandum on Ground-Water Remediation At Superfund Sites", May 27, 1992

Prepared By/Date: CJD / 9-7-92  
 Checked By/Date: MGD / 9-10-92

Table 17: Summary of Ground-Water Analyses  
1984 - 1992

Well Identification	W-1	W-1	W-1	W-1	W-2	W-2	W-3	W-3	W-4	W-4	W-4	W-4
Sample Date	9/84 (1)	8/90 (2)	9/90 (2)	1/91 (3)	9/84 (1)	2/91 (3)	9/84 (1)	2/91 (3)	9/84 (1)	8/84 (1)	9/90 (2)	2/91 (3)
Parameter	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)
PCBs	<0.1	ND	ND	NA	<0.1	NA	ND	NA	<0.1	ND	ND	NA
Total Cyanide	NA	<20	<20	NA	NA	NA	NA	NA	NA	<20	<20	NA
Total Phenols	NA	<10	<5	NA	NA	NA	NA	NA	NA	<5	<5	NA
Semi-Volatile Organic Compounds	NA	ND	ND	NA	NA	NA	NA	NA	NA	ND	ND	NA
Pesticides	NA	ND	ND	NA	NA	NA	NA	NA	NA	ND	ND	NA
Total Antimony	NA	<3	<3	NA	NA	NA	NA	NA	NA	<3	<3	NA
Total Arsenic	NA	<47	3	<2	NA	<2	NA	<2	NA	5	2	<2
Total Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Beryllium	NA	<5	<10	NA	NA	NA	NA	NA	NA	<5	<10	NA
Total Cadmium	NA	<2	3	NA	NA	NA	NA	NA	NA	<2	2	NA
Total Chromium	NA	<90	1	1	NA	<1	NA	<1	NA	8	7	<1
Total Copper	NA	120	<10	NA	NA	NA	NA	NA	NA	20	<10	NA
Total Lead	NA	76	<1	<1	NA	<1	NA	<1	NA	11	<1	<1
Total Mercury	NA	0.3	<0.2	NA	NA	NA	NA	NA	NA	<0.2	<0.2	NA
Total Nickel	NA	70	<10	NA	NA	NA	NA	NA	NA	<10	<10	NA
Total Selenium	NA	3	<5	NA	NA	NA	NA	NA	NA	3	<5	NA
Total Silver	NA	2	<2	NA	NA	NA	NA	NA	NA	3	2	NA
Total Thallium	NA	<5	<5	NA	NA	NA	NA	NA	NA	<5	<5	NA
Total Zinc	NA	247	19	NA	NA	NA	NA	NA	NA	45	11	NA





Table 17: Summary of Ground-Water Analyses - Continued

Well Identification	W-11B	W-12	W-12	W-13	S-3	S-3	S-3	S-3	S-3	T-3	T-4
Sample Date	2/91 (3)	2/91 (3)	2/91 (3)	2/91 (3)	9/84 (1)	8/90 (2)	9/90 (2)	9/90 (2)	1/91 (3)	9/84 (1)	9/84 (1)
Parameter	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)
PCBs	NA	NA	NA	NA	<0.1	ND	ND	ND	NA	<0.1	<0.1
Total Cyanide	NA	NA	NA	NA	NA	<20	<20	<20	NA	NA	NA
Total Phenols	NA	NA	NA	NA	NA	<5	<5	<5	NA	NA	NA
Semi-Volatile Organic Compounds	NA	NA	NA	NA	NA	ND	ND	ND	NA	NA	NA
Pesticides	NA	NA	NA	NA	NA	ND	ND	ND	NA	NA	NA
Total Antimony	NA	NA	NA	NA	NA	5	<3	<3	NA	NA	NA
Total Arsenic	15	<2	<5	<2	NA	120	<2	<2	<2	NA	NA
Total Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Beryllium	NA	NA	NA	NA	NA	<5	<10	<10	NA	NA	NA
Total Cadmium	NA	NA	NA	NA	NA	3	<2	<2	NA	NA	NA
Total Chromium	32	1	<1	1	NA	120	1	1	<1	NA	NA
Total Copper	NA	NA	NA	NA	NA	470	<10	<10	NA	NA	NA
Total Lead	10	<1	<5	<1	NA	250	<1	<1	<1	NA	NA
Total Mercury	NA	NA	NA	NA	NA	0.5	<0.2	<0.2	NA	NA	NA
Total Nickel	NA	NA	NA	NA	NA	140	<10	<10	NA	NA	NA
Total Selenium	NA	NA	NA	NA	NA	<2	<5	<5	NA	NA	NA
Total Silver	NA	NA	NA	NA	NA	7	<2	<2	NA	NA	NA
Total Thallium	NA	NA	NA	NA	NA	<5	<5	<5	NA	NA	NA
Total Zinc	NA	NA	NA	NA	NA	814	17	17	NA	NA	NA

Notes:

ND = Not detected above practical quantitation limits (PQLs) shown on laboratory data sheets

NA = Not analyzed

ppb = parts per billion

T-3 = Torrington Well No. 3

T-4 = Torrington Well No. 4

(1) Canonic, "Environmental Assessment," 1984

(2) Best, "Final Report Environmental Assessment," October 1990

(3) Best, "Subsurface Environmental Assessment and Remedial Action Plan," April 1991

Prepared By/Date CJD / 9-6-92  
 Checked By/Date MCO / 8-31-92



Table 18: Summary of Sediment Analyses for VOCs Identified Above Detection Limits - Continued

Pond Number	4	4	4	4	4	4	4	4	4
Sample Identification	Pond 4	Pond 4	Pond 4-1	Pond 4-1	Pond 4-1	Pond 4-2	Pond 4-3	Pond 4-4	Pond 4-5
Depth (Ft.)			(2-4)	(2-4)	(2-4)	(6-8)	(2-4)	(4-6)	(4-6)
Sample Date	5/86 (3)	2/91 (4)	9/91 (5)	3/92 (6)	3/92 (6)	3/92 (6)	3/92 (6)	3/92 (6)	3/92 (6)
Parameter	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)
1,1,1-Trichloroethane	830	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	100	560	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	28	ND	ND	ND	3,100	3,100	3,500	3,300	3,100
Mineral Spirits	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	34	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	47	ND	ND	ND	ND	ND	ND*	ND*	ND*
Acetone	27	ND	ND	ND	ND	ND	ND	680	1,300
2-Butanone	59	ND	NA	NA	NA	NA	NA	NA	NA
Chloroform	ND	ND	ND	ND	ND*	ND*	ND*	ND*	ND
Toluene	ND	ND	ND	ND	ND	ND	ND*	ND*	ND*
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND*	ND	ND*
Total Xylenes	ND	ND	ND	ND	ND	ND	ND*	ND	ND*

Table 18: Summary of Sediment Analyses for VOCs Identified Above Detection Limits - Continued

Pond Number	4	4	4	4	4	5	5	5	5
Sample Identification	Pond 4-6	Pond 4-7	Pond 4-8	Pond 4-9	Pond 5	Pond 5	Pond 5	Pond 5	Pond 5
Depth (Ft.)	(2-4)	(4-6)	(4-6)	(2-4)	(0-1)	(0-1)	(0-1)	(0-1)	(0-1)
Sample Date	3/92 (6)	3/92 (6)	3/92 (6)	3/92 (6)	1984 (1)	8/84 (2)	8/84 (2)	8/84 (2)	2/91 (4)
Parameter	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	3,500	3,200	3,500	3300	560	ND	ND	27	ND
Mineral Spirits	NA	NA	NA	NA	NA	360	360	NA	NA
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND*	ND*	ND*	ND	ND	ND	ND	16	ND
Acetone	1,200	1,300	ND	850	--	NA	NA	ND	ND
2-Butanone	NA	NA	NA	NA	--	NA	NA	ND	ND
Chloroform	ND*	ND*	ND	ND*	ND	ND	ND	26	ND
Toluene	ND	ND*	ND*	ND*	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND*	ND	ND	ND	ND	ND	ND	ND
Total Xylenes	ND	ND*	ND	ND	ND	ND	ND	ND	ND

Notes:

ND = Not detected above practical quantitation limits (PQLs) shown on laboratory data sheets .

NA = Not analyzed

ppb = parts per billion

ND \* = Compound was positively identified, but is less than 20% of the estimated quantitation limit

VOCs = volatile organic compounds

-- = Laboratory data sheets are not available for sediment samples collected by EIS.

(1) Torrington, "Environmental Assessment", March 11, 1985

(2) Canonic, "Environmental Assessment" 1984

(3) Harza, "Environmental Assessment," June 1986

(4) BEST, "Subsurface Environmental Assessment and Remedial Action Plan," April 1991

(5) Capsule, "Draft Torrington Investigation Report," November 13, 1991

(6) Capsule, "Phase II Torrington Investigation Report, Volume 1," May 26, 1992

This table presents only VOCs identified above detection limits.

Prepared By/Date CSD / 9 7 92  
 Checked By/Date MLO / 8-31-92

Table 19: Summary of Sediment Analyses for PCBs, TPH, and Metals  
1984 - 1992

Pond Number	1	2	2	3	3	4	4	4	4	4	4	4	4	4	5	5
Sample	Pond 1	Pond 2	Pond 2	Pond 3	Pond 3	Pond 4	Pond 4	Pond 4-1	Pond 4-2	Pond 4-3	Pond 4-4	Pond 4-6	Pond 4-8	Pond 5	Pond 5	Pond 5
Identification	(0-1)	(0-1)	(0-1)	(0-1)	(0-1)	(0-1)	(0-1)	(2-4)	(6-8)	(2-4)	(4-6)	(2-4)	(4-6)	(0-1)	(0-1)	(0-1)
Depth (FL)	7/84 (2)	7/84 (1)	7/84 (2)	7/84 (2)	7/84 (1)	8/84 (1)	8/84 (2)	9/91 (3)	3/92 (4)	3/92 (4)	3/92 (4)	3/92 (4)	3/92 (4)	1984 (1)	1984 (2)	1984 (2)
Sample Date	1984 (1)	1984 (1)	1984 (1)	1984 (1)	1984 (1)	1984 (1)	1984 (1)	9/91 (3)	3/92 (4)	3/92 (4)	3/92 (4)	3/92 (4)	3/92 (4)	1984 (1)	1984 (1)	7/84 (2)
Parameter	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
PCBs	<2	<2	<2	<2	<2	<2	<2	NA	NA	NA	NA	NA	NA	<2	<2	<2
TPH	NA	NA	NA	NA	NA	NA	NA	39,000	NA	4,900	5,600	NT	5,200	NA	NA	NA
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	0.24	NA	NA	0.53	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	14	ND	NA	NA	3.2	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA	NA	6.4	NA	NA	51	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	NA	NA	7.1	0.32	NA	NA	1.4	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA	NA	NA	56	ND	NA	NA	33	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	220	ND	NA	NA	61	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA	0.64	0.031	NA	NA	0.58	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	ND	1.3	NA	NA	3.1	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA	ND	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA	1,000	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA	49	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

- (1) Torrington, "Environmental Assessment," March 11, 1985
- (2) Canonic, "Environmental Assessment," 1984
- (3) Capsule, "Draft Torrington Investigation Report," November 13, 1991
- (4) Capsule, "Phase II Torrington Investigation Report Volume I," May 26, 1992

< = less than

ND = Not detected above practical quantification limits (PQLs) shown on laboratory data sheets .

NA = Not analyzed

ppm = parts per million

PCBs = polychlorinated biphenyls

TPH = total petroleum hydrocarbons

Prepared By/Date CJD / 9-6-92  
Checked By/Date MGO / 9-1-92

**Table 20: Summary of Surface Water Analyses for  
VOCs Identified Above Detection Limits and PCBs  
1984**

Sample Identification	Pond 1	Pond 1	Pond 2	Pond 2	Pond 3	Pond 3	Pond 4	Pond 4	Pond 5	Pond 5
Sample Date	1984 (1)	7/84 (2)	1984 (1)	7/84 (2)	1984 (1)	7/84 (2)	1984 (1)	8/84 (2)	1984 (1)	8/84 (2)
Parameter	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)
PCBs	NA	ND	NA	ND	NA	NS	NA	<3*	NA	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	1.5	NS	4.4	ND	5.7	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	NS	ND	ND	0.53	ND
Tetrachloroethene	0.8	ND	1.2	ND	6.3	NS	ND	ND	4.1	ND
Methylene Chloride	32	ND	24	ND	23	NS	16	ND	9.7	ND

**Notes:**

ND = Not detected above practical quantitation limits (PQLs) shown in laboratory data sheets.

NS = Not sampled

NA = Not analyzed

ppb = parts per billion

VOCs = volatile organic compounds

PCBs = polychlorinated biphenyls

\* = According to the laboratory data sheets, peaks are present but they don't appear to be PCBs.

(1) = Torrington, "Environmental Assessment," March 11, 1985

(2) = Canonic, "Environmental Assessment," 1984

This table summarizes only the VOCs identified above detection limits and PCBs.

Prepared By/Date CJD / 9-7-92  
Checked By/Date MGD / 9-31-92

**Table 21: Summary of Paint Chip Analyses for TCLP Metals  
August 1990**

Sample Identification	PP1	PP2
Sample Date	8/10/90	8/10/90
Parameter	(ppm)	(ppm)
Arsenic (TCLP)	0.019	0.010
Barium (TCLP)	<0.01	0.78
Cadmium (TCLP)	0.310	0.177
Chromium (TCLP)	0.15	<0.01
Lead (TCLP)	3.59	32.2
Mercury (TCLP)	0.0012	0.0003
Selenium (TCLP)	0.008	<0.01
Silver (TCLP)	0.040	0.010

Notes:

- ppm = part per million
- TCLP = Toxicity Characteristics Leachable Procedure
- < = less than
- PP1 = composite sample collected in the heat treat area (Paint Reel #1)
- PP2 = composite sample collected in the machine shop area (Paint Reel #2)

Source: BEST, "Final Report, Environmental Assessment", October 1990

Prepared By/Date: CJD / 9/7/92  
 Checked By/Date: MGD / 8/31/92

Table 22: Summary of Waste Pits Analyses, August 1990

Sample Identification	P-1 <sup>1</sup>	P-2 <sup>2</sup>	P-3 <sup>2</sup>	P-4 <sup>2</sup>	P-5 <sup>3</sup>	P-6 <sup>2</sup>	P-7 <sup>1</sup>	P-8 <sup>2</sup>	P-9 <sup>1</sup>	P-10 <sup>3</sup>
Sample Date	8/7/90	8/7/90	8/7/90	8/7/90	8/7/90	8/7/90	8/7/90	8/7/90	8/7/90	8/7/90
Parameter	Unit									
pH	-	8.38	7.34	8.47	6.74	7.04	8.61	8.90	7.89	6.25
Phenols Total	ppm	0.006	2.598	<0.236	5.093	4.927	12.500	4.137	0.170	2.238
Total React. Cyanide	ppm	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total React. Sulfide	ppm	<0.49	<0.49	1.99	0.99	1.99	<0.49	<0.49	<0.49	<0.49
Ignitability	F	>210	>210	>210	>210	>210	>210	>210	>210	>210
Paint Filter Test	-	Failed	Passed	Passed	Failed	Passed	Failed	Passed	Failed	Failed
Total PCBs	ppm	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	ppm	0.003	0.008	0.008	0.004	0.005	0.036	0.009	0.011	<0.002
Barium	ppm	0.03	126	<0.01	93.7	0.74	0.52	2.04	0.95	2.23
Cadmium	ppm	<0.002	0.047	<0.002	0.015	0.043	0.006	0.092	0.023	0.052
Chromium	ppm	0.003	<0.01	<0.01	0.08	<0.01	0.14	0.48	0.12	0.07
Lead	ppm	0.003	0.06	<0.03	0.15	0.12	0.18	<0.03	0.008	<0.03
Mercury	ppm	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	0.0012	0.0003	0.0006	0.0003
Selenium	ppm	0.005	0.005	0.003	<0.002	0.0003	0.020	<0.002	0.004	<0.002
Silver	ppm	<0.002	0.007	0.018	<0.002	0.010	0.018	0.015	0.005	0.006
F-list Solvent Scan	ppm	ND	ND	ND	Detected	ND	Detected	ND	ND	ND
1,1,1-Trichloroethane	ppm	ND	ND	ND	5.0	ND	ND	ND	ND	ND
Toluene	ppb	ND	ND	ND	ND	ND	205	ND	ND	ND
Total Xylenes	ppb	ND	ND	ND	ND	ND	23	ND	ND	ND



Table 22: Summary of Waste Pits Analyses - Continued

Notes:

- ND = Not detected above practical quantitation limits (PQLs) shown on laboratory data sheets in Appendix D
- F = Fahrenheit
- < = less than
- > = greater than
- = parameter is unitless
- Passed = sample contained no free liquids as defined and regulated by 40 CFR 264.314 and CFR 265.314
- Failed = sample contained free liquids as defined and regulated by 40 CFR 264.314 and CFR 265.314
- ppm = parts per million
- ppb = parts per billion
- Detected = one or more compound identified above detection limits
- <sup>1</sup> = Inorganics (metals) are in total concentrations
- <sup>2</sup> = Inorganic (metals) are in toxicity characteristics (TC) concentrations
- <sup>3</sup> = Inorganic (metals) are in leachate concentrations

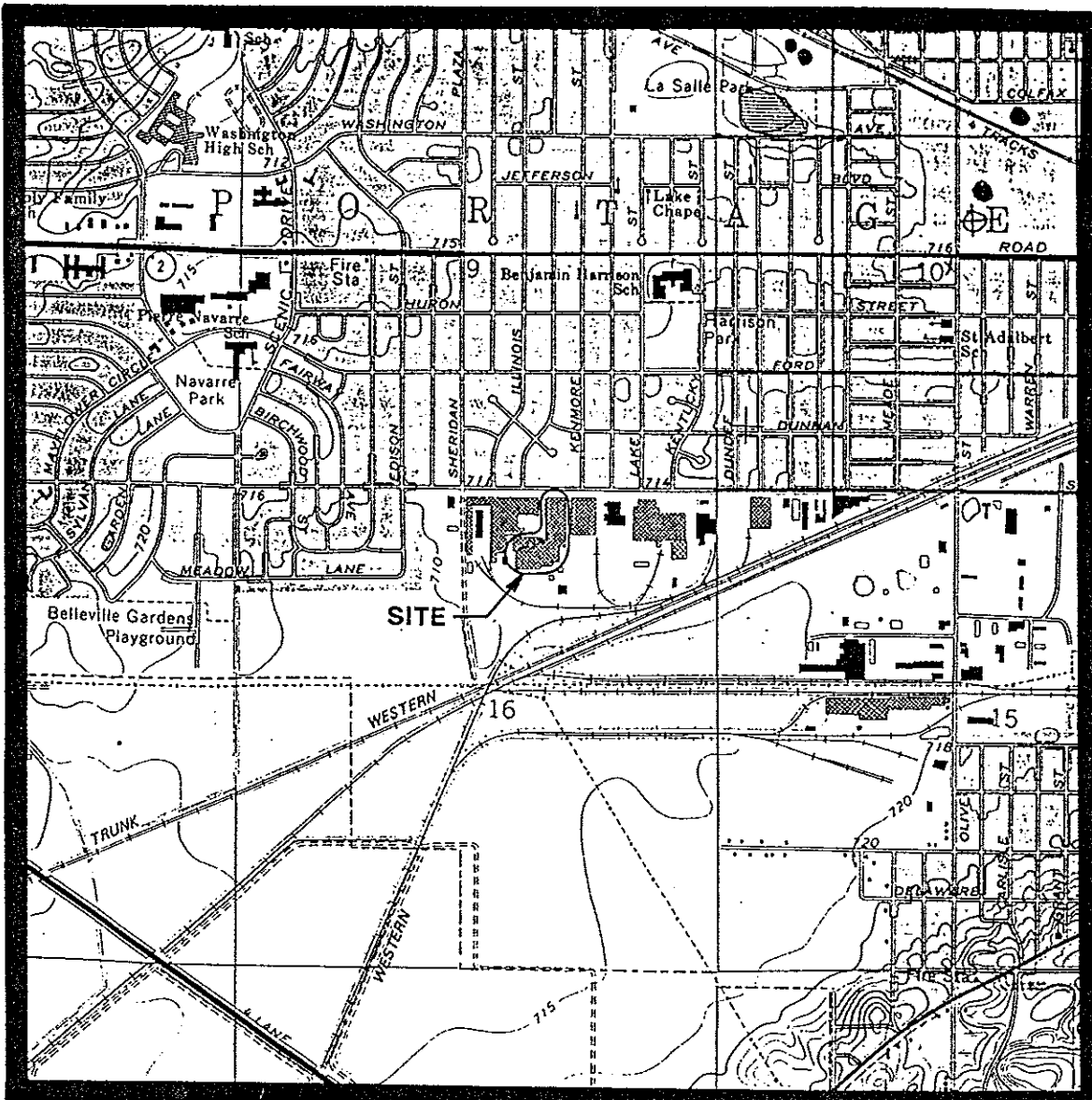
Source: BEST, "Final Report, Environmental Assessment", October 1990

Prepared By/Date: CD / 9/7/92  
Checked By/Date: MCO / 8:31/92

**FIGURES**

SOURCE: U.S. GEOLOGICAL SURVEY; 7.5 MINUTE SERIES (TOPOGRAPHIC)  
 SOUTH BEND WEST, INDIANA QUADRANGLE; PHOTOREVISED 1986.

N



0 0.5 1.0

APPROXIMATE SCALE IN MILES

0 1000 2000 3000 4000 5000

APPROXIMATE SCALE IN FEET



DRAWN BY JCM CHECKED BY CJD

THE TORRINGTON COMPANY  
 3702 WEST SAMPLE STREET  
 SOUTH BEND, INDIANA



LAW ENVIRONMENTAL, INC.

ST. LOUIS, MISSOURI

SITE LOCATION MAP

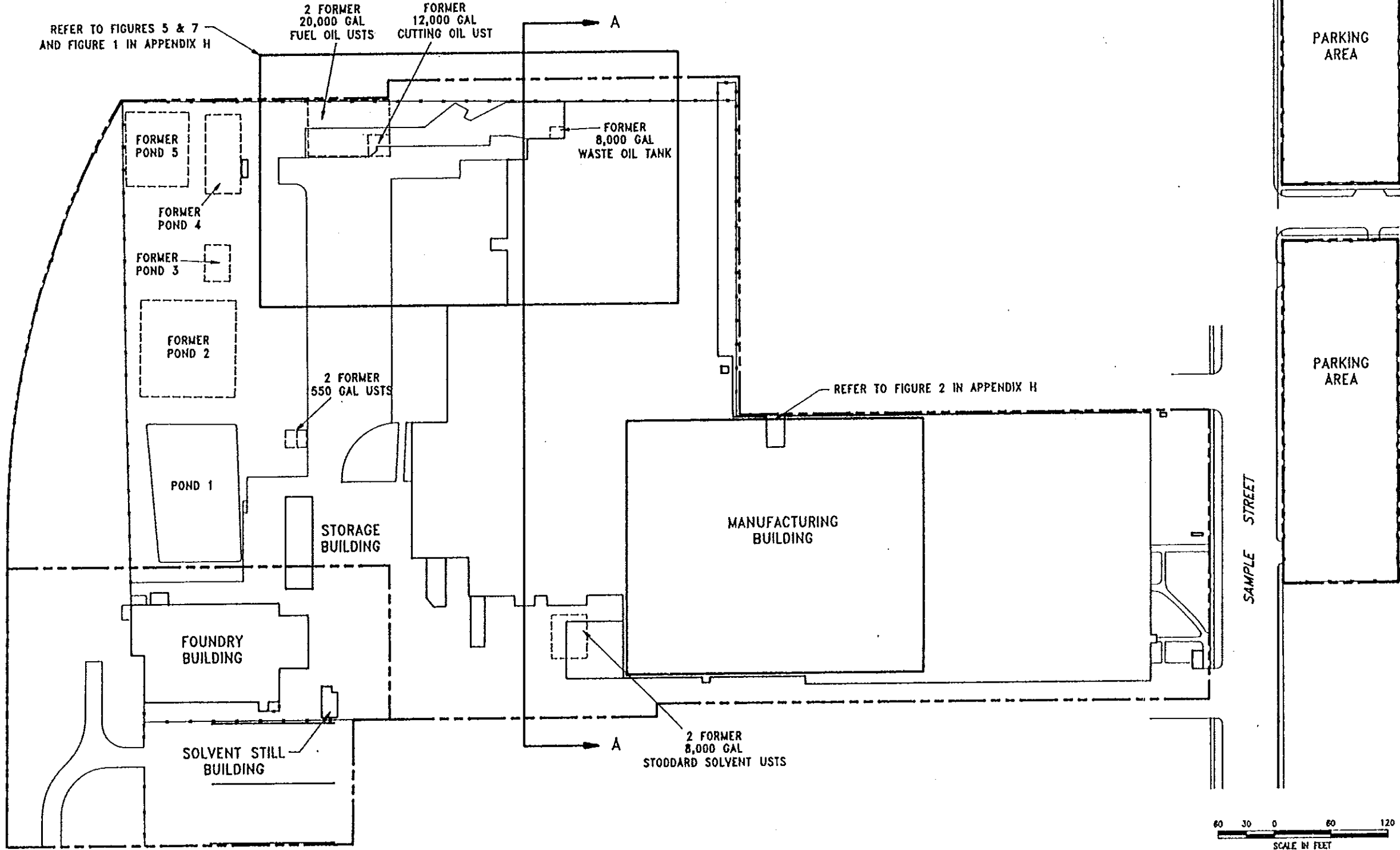
PROJECT NO. 53-2645

FIGURE 1

N71744

SOURCE:  
 BASE MAP PROVIDED BY  
 PEIRCE & ASSOCIATES  
 LAND SURVEYORS & PROFESSIONAL ENGINEERS  
 DRAWING NUMBER 912391  
 DRAWING DATED 10-10-91 (REVISED 11/21/91)

REFER TO FIGURES 5 & 7  
 AND FIGURE 1 IN APPENDIX H



REFER TO FIGURE 2 IN APPENDIX H



REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED  
 DRAWN S.C. Campbell III  
 CHECKED  
 IN CHARGE  
 DATE 9/6/92

THE TORRINGTON COMPANY  
 3702 WEST SAMPLE STREET  
 SOUTH BEND, INDIANA

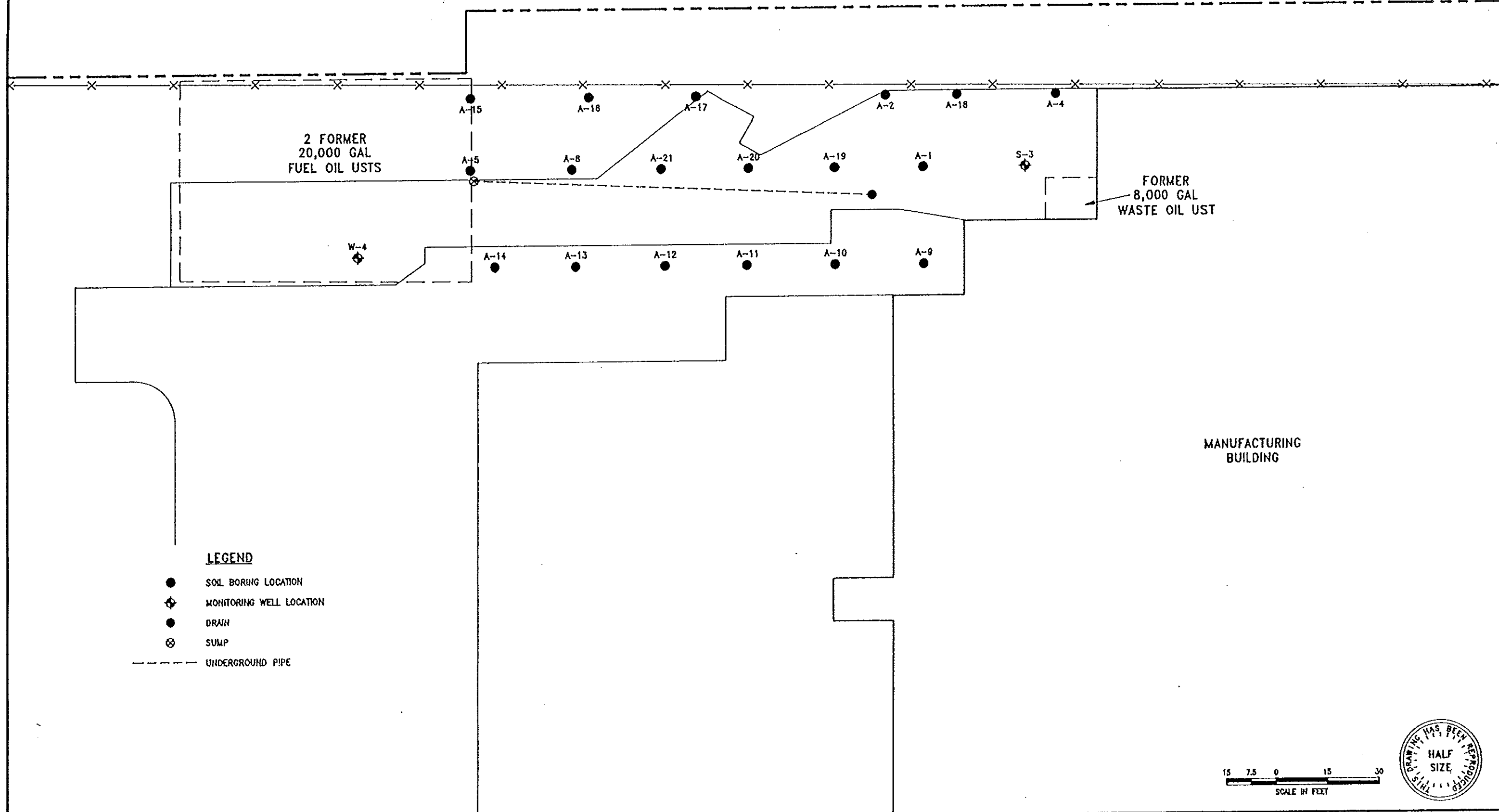
LAW ENVIRONMENTAL, INC.  
 ST. LOUIS, MISSOURI

SITE PLAN

SCALE	1" = 60'		
CONTRACT	53-2645		
DWG. NO.	REV.	FIGURE	
-	-	2	

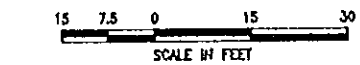
CADD FILE: P:\DWG\532645\10042E.PLOT DATE: 09/02/92

SOURCE:  
CANONIC ENGINEERS  
"SITE ASSESSMENT"  
DATED 1984



**LEGEND**

- SOIL BORING LOCATION
- ⊕ MONITORING WELL LOCATION
- DRAIN
- ⊗ SUMP
- - - UNDERGROUND PIPE



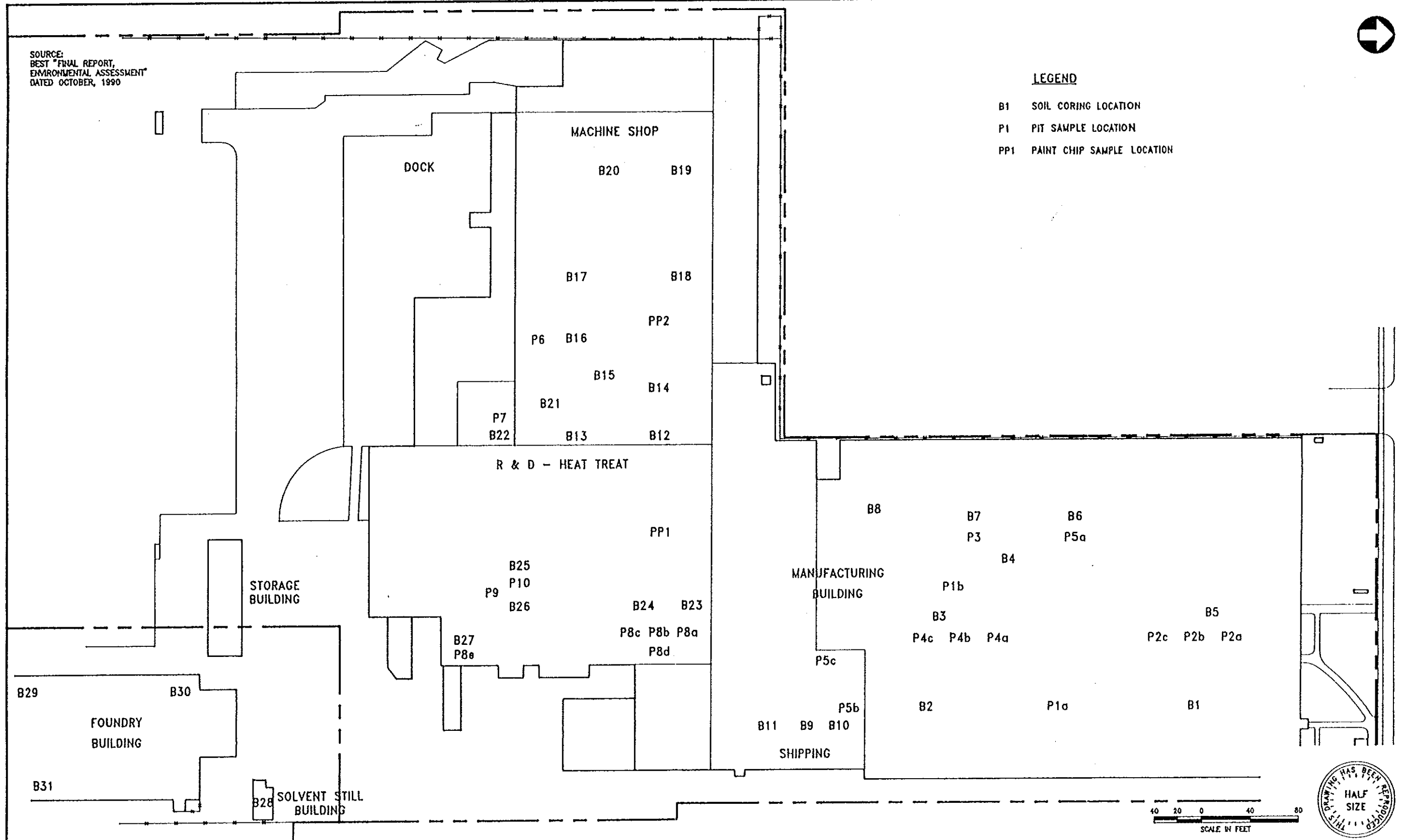
DESIGNED DRAWN S.C. Campbell III CHECKED IN CHARGE DATE 9/6/92				THE TORRINGTON COMPANY 3702 WEST SAMPLE STREET SOUTH BEND, INDIANA		LAW ENVIRONMENTAL, INC. ST LOUIS, MISSOURI		SITE PLAN SHOWING LOCATION OF SOIL BORINGS A-8 THROUGH A-21		SCALE 1" = 15' CONTRACT 53-2845 DWR. NO. REV. FIGURE - - 5	
REV	DATE	BY	SUB	APP	DESCRIPTION	SUBMITTED	APPROVED			CAD FILE: 100426 PLOT DATE: 08/21/92	



SOURCE:  
BEST "FINAL REPORT,  
ENVIRONMENTAL ASSESSMENT"  
DATED OCTOBER, 1990

**LEGEND**

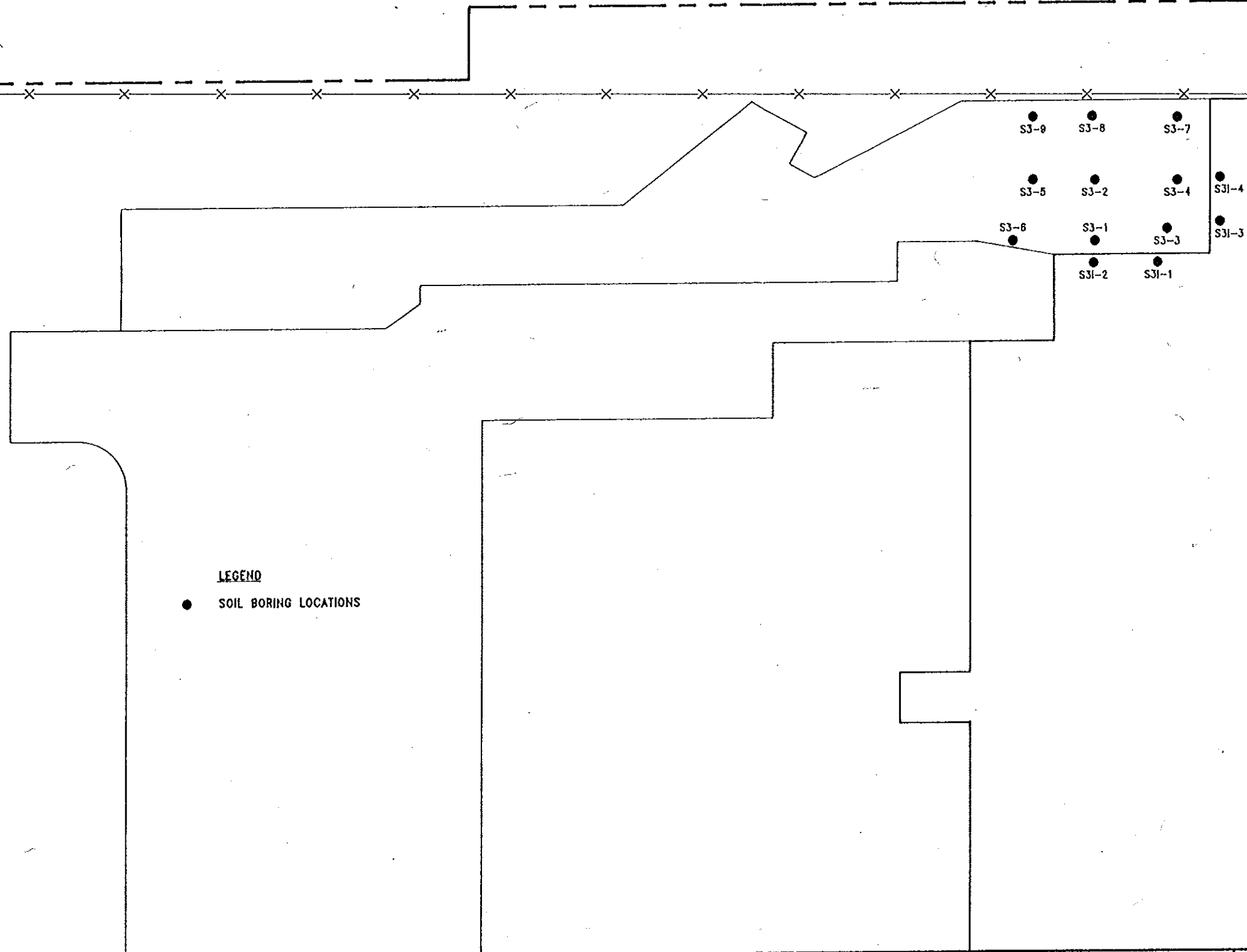
- B1 SOIL CORING LOCATION
- P1 PIT SAMPLE LOCATION
- PP1 PAINT CHIP SAMPLE LOCATION



DRAWN S.C. Campbell III CHECKED CJP IN CHARGE DATE 9/7/92			THE TORRINGTON COMPANY 3702 WEST SAMPLE STREET SOUTH BEND, INDIANA		LAW ENVIRONMENTAL, INC. ST LOUIS, MISSOURI		SCALE 1" = 40' CONTRACT 53-2645 DWG. NO. REV. FIGURE - - 6		
REV	DATE	BY	SUB	APP	DESCRIPTION	SUBMITTED	APPROVED	SITE PLAN SHOWING SOIL CORING, PAINT CHIP AND WASTE PIT SAMPLING LOCATIONS	

PLOT DATE: 06/21/92  
CADD FILE: 100428

SOURCE:  
CAPSULE ENVIRONMENTAL  
"PHASE II TORRINGTON INVESTIGATION REPORT VOLUME 1"  
DATED MAY 26, 1992



**LEGEND**  
● SOIL BORING LOCATIONS


MANUFACTURING  
BUILDING



REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED  
DRAWN  
S.C. Campbell III  
CHECKED  
IN CHARGE  
DATE 9/7/92

THE TORRINGTON COMPANY  
3702 WEST SAMPLE STREET  
SOUTH BEND, INDIANA  
SUBMITTED

 LAW ENVIRONMENTAL, INC.  
ST LOUIS, MISSOURI  
APPROVED

SITE PLAN SHOWING LOCATION OF  
SOIL BORINGS S3-1 THROUGH S3-9  
AND S3I-1 THROUGH S3I-4

SCALE 1" = 15'		
CONTRACT 53-2645		
OWN. NO.	REV.	FIGURE
-	-	7

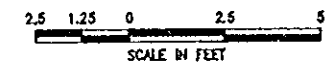
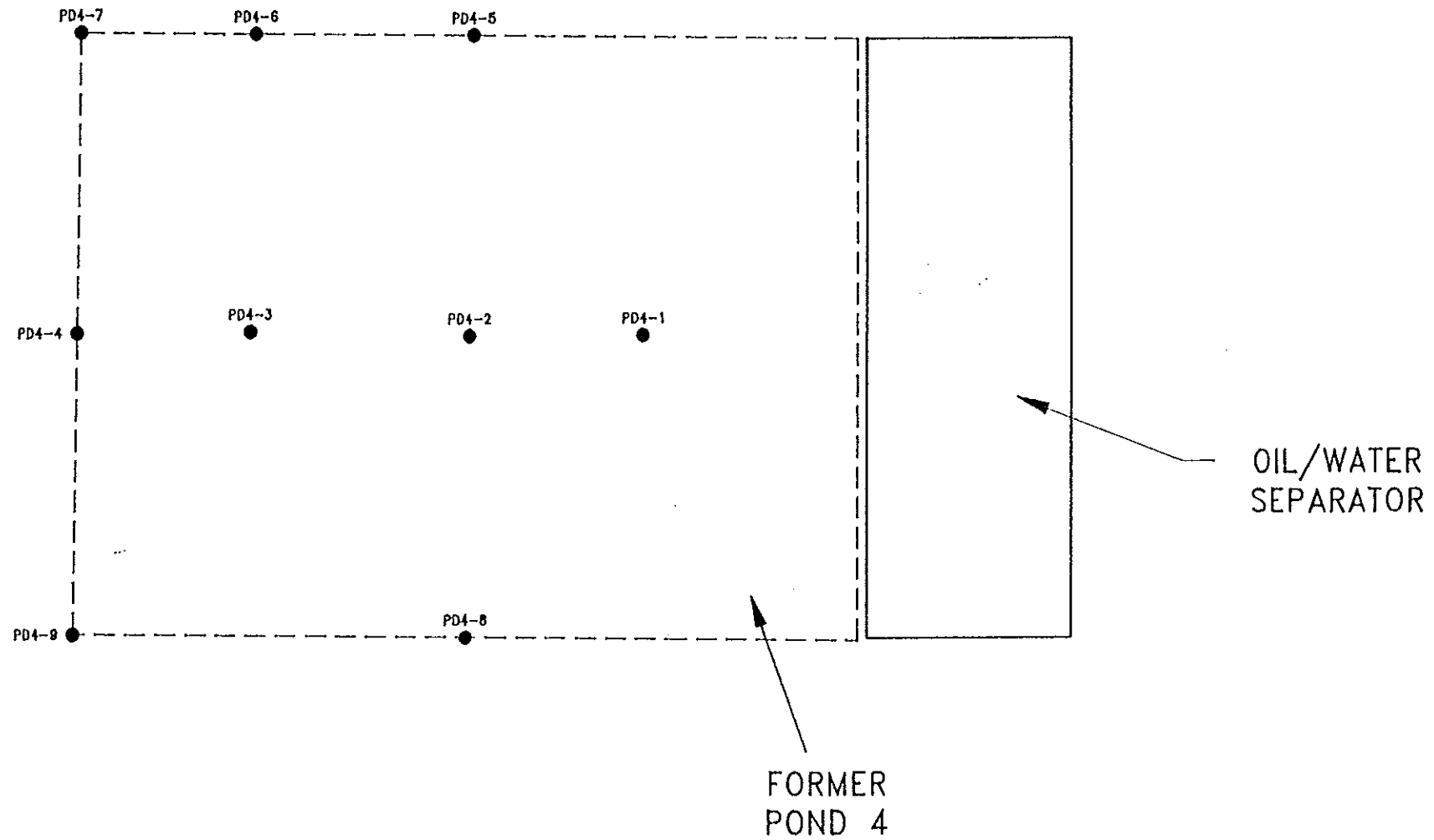
PLOT DATE: 09/04/92  
CADD FILE: 10042

SOURCE:  
CAPSULE, PHASE I,  
TORRINGTON INVESTIGATION REPORT, VOLUME 1,  
MAY 26, 1992



LEGEND

● SOIL BORING LOCATION

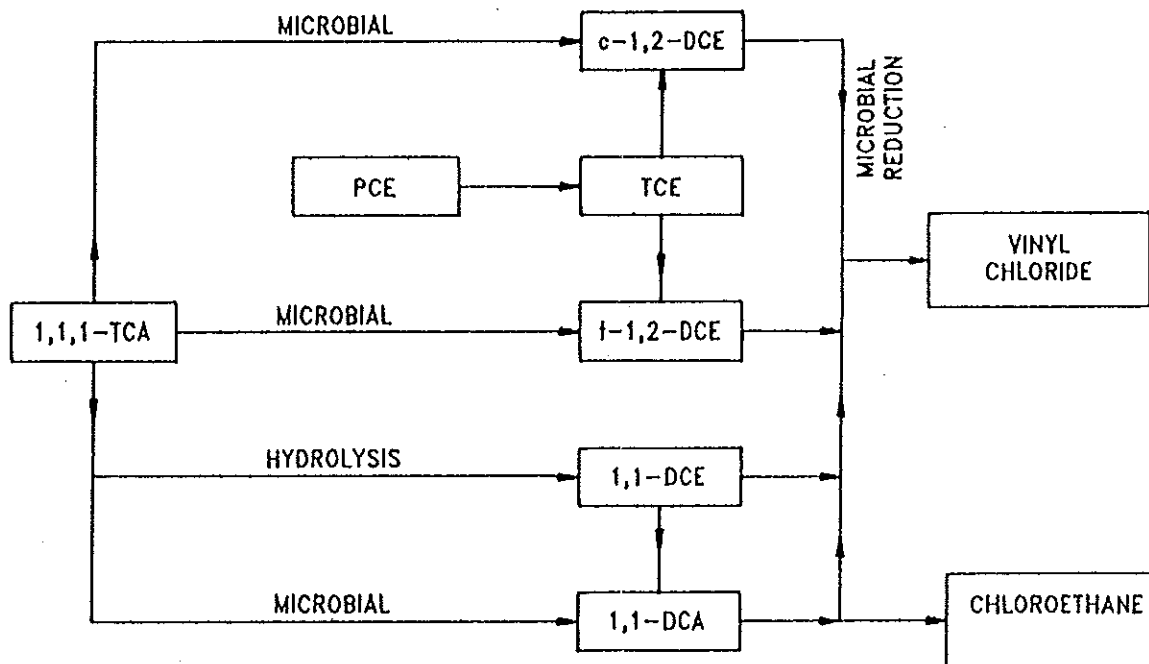
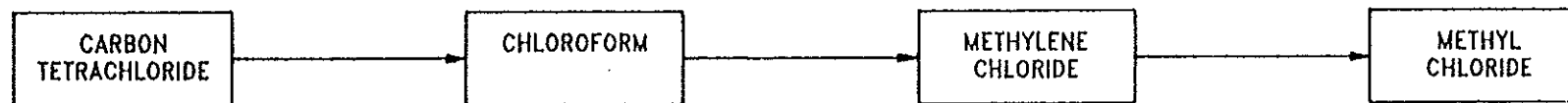


				DESIGNED	THE TORRINGTON COMPANY 3702 WEST SAMPLE STREET SOUTH BEND, INDIANA	 LAW ENVIRONMENTAL, INC. ST LOUIS, MISSOURI	SCALE 1" = 2.5'			
				DRAWN S.C. Campbell III			CONTRACT 53-2645	DWG. NO.	REV.	PAGE NO.
				CHECKED <i>[Signature]</i>				X	X	8
				IN CHARGE						
REV	DATE	BY	SUB	APP	DESCRIPTION	DATE 9/7/92	SUBMITTED	APPROVED		

PLOT DATE: 09/04/92



SOURCE:  
 "DEGRADATION OF VOLATILE CHLORINATED ALIPHATIC PRIORITY  
 POLLUTANTS IN GROUND WATER"  
 LEVERETT R. SMITH AND JAMES DRAGUN  
 SEPTEMBER 15, 1984



REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED  
 DRAWN S.C. Campbell III  
 CHECKED [Signature]  
 IN CHARGE  
 DATE 9/1/82

THE TORRINGTON COMPANY  
 3702 WEST SAMPLE STREET  
 SOUTH BEND, INDIANA  
 SUBMITTED

LAW ENVIRONMENTAL, INC.  
 ST LOUIS, MISSOURI  
 APPROVED

TRANSFORMATION PATHWAYS FOR  
 VARIOUS VOLATILE ORGANIC  
 PRIORITY POLLUTANTS IN  
 SOIL-GROUNDWATER SYSTEMS

SCALE		NONE
CONTRACT		53-2645
DWG. NO.	REV.	FIGURE
-	-	9

CADD FILE: 109A3 PLOT DATE 09/03/92